LITERATURE OF MANUFACTURERS

Catalogues, bulletins and other direct advertising material recently issued.

Manufacturers are requested to send copies of new trade literature promptly to Electric Refrigeration News.

Diamond Tool & Engineering Co.

The refrigeration division of the Diamond Tool & Engineering Co., Detroit, has issued a broadside which describes the Econom-ice condensing and cooling unit.

Electrolux

A broadside issued by Servel, Inc., Evansville, Ind., describes seven models of Electrolux refrigerators, with food capacities ranging from 4 cu. ft. to 10 cu. ft. One of the models is a combination of range and refrigerator, while another with an outside height of 31½ inches has the top arranged so that it may be used as a serving or working table.

Halsey Taylor

Eleven electric water coolers for installation with Kelvinator equipment are described in Bulletin K issued by the Halsey W. Taylor Co., Warren, Ohio. Specifications and construction features of the coolers are given, and a cutaway photograph shows the interior features of the cooler. Six tables in the bulletin contain data for handling water cooling problems.

Silverice

Methods of cooling drinks and certain foods with Silverice balls are described in a folder received from Silverice, Inc., 280 Broadway, New York, N. Y. Several photographs show how Silverice balls should be placed and removed from the tray in the freezing chamber.

REQUESTS FOR INFORMATION

Readers who can assist in furnishing correct answers to inquiries or who can supply additional information are invited to address Electric Refrigeration News, referring to the query number.

Answers to Previous Queries

Query No. 188—The Sun Oil Co., Philadelphia, Pa., writes: "We beg to advise that we manufacture all types of asphalt ranging from 85° melting point to 210° melting point. This material is shipped in drums or tankcars and is manufactured to meet various specifications.

"Regarding application to refrigerator cabinets, cases and coolers, etc., we do not recommend how to apply any of these grades as every manufacturer has his own way of applying materials for insulation, as a rule, also, we do not recommend any particular melting point for any particular insulation job owing to the fact that many manufacturers have their own specifications for this type of material."

Household Refrigerators

Query No. 201—A reader in New York writes, "Can you furnish me with a list of manufacturers of household refrigerators? I would like to obtain some general information about the specifications and construction details of the various makes. Must I write to manufacturers or have you such data available?"

NOTE—The directory in the Jan. 2, 1929, issue of ELECTRIC REFRIGERATION NEWS lists manufacturers of household refrigerators. See additional data in this issue.—Editor.

V-Belts

Query No. 202—A reader in Tennessee asks, "Can you put us in touch with someone who makes V-belts for Frigidaires? Also any other makers of parts for small refrigerating machines such as Frigidaires, Kelvinators, Copelands, etc."

NOTE—The Iceless Cabinet Accessories, 2401 Chestnut St., Philadelphia, Pa., can furnish V-belts for all standard electric refrigeration machines. You can also secure parts for all standard machines from the Davies B. & E. Co., 2016 So. Bancroft St., Philadelphia, Pa.—Editor.

Flexible Conduit

Query No. 203—"Could you give me any information as to where I could obtain a flexible tubing, suitable for enclosing the copper tubing on apartment house installations. I desire to obtain a sales agency for same, as there have been frequent calls for it."

NOTE—Flexible conduit is made by the following companies: American Circular Loom Co., 90 West St., New York, N. Y.; American Metal Molding Co., 146 Colt St., Irvington, N. J.; Arrow Flexible Conduit Co., 119 Bleecker St., New York, N. Y.; National Electric Products Corp., Pittsburgh, Pa.; Federal Armored Cable Co., 520 W. Forty-first St., New York, N. Y., and the Triangle Conduit Co., Brooklyn, N. Y.—Editor.

Kapock

Query No. 204—A subscriber in Massachusetts inquires, "We would appreciate it very much if you could advise us at your earliest convenience who manufactures 'Kapock,' the insulating material used in ice cream cabinets."

Query No. 205—A reader writes, "Will you please advise us where we can secure motor generator equipment to operate on 110 volt direct current and supply 110 volt alternating current suitable for operating the smaller types of electric refrigerators."

NOTE—The Electric Specialty Co., Stamford, Conn., are manufacturers of small motor generator sets.—Editor.

Palmer Thermometers

Query No. 206—A reader in California asks, "Can you obtain for me the name of the instrument company who manufactures the Palmer pocket thermometer? I have seen this thermometer several times but it does not bear the name of the manufacturer."

Air or Water Cooled Compressor

Query No. 207—A reader in Illinois writes: "We would greatly appreciate your opinion as to whether the air or water cooled compressor is the most efficient for multiple domestic use. The refrigerent used would be So_2. The size of compressor used would be 1½ horsepower."

Allison Machine

Query No. 208—A subscriber in Michigan asks: "Can you tell me whether the electric refrigerator called the "Allison" is still made? It was a hermetically sealed machine and was manufactured somewhere in the East."

NOTE—The electric refrigerator formerly known as the Ellison is now called the Holmes and is made by Holmes Products, Inc., 205 East Forty-second St., New York, N. Y.—Editor.

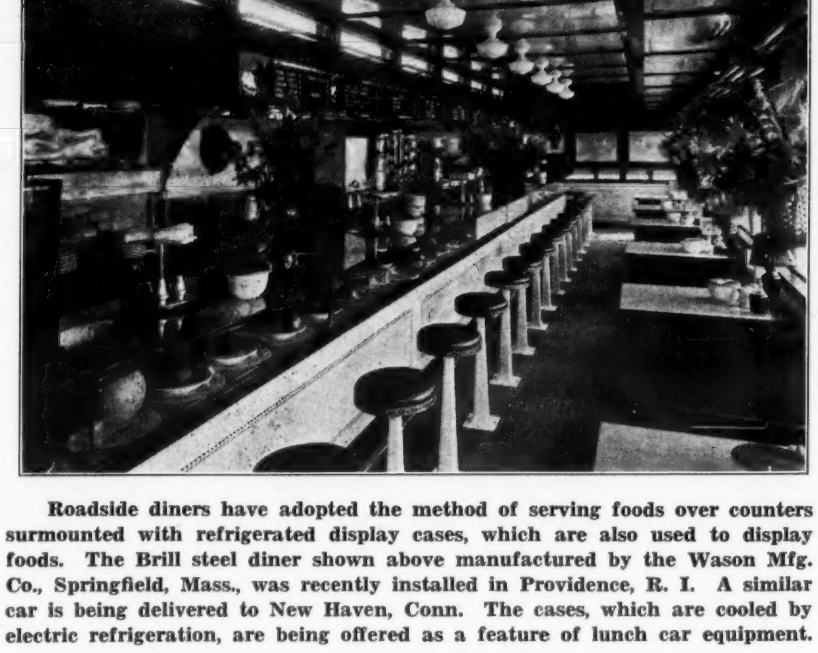
Frozen Air Products Co.

Query No. 209—A reader in the East writes: "We have received an inquiry about the Frozen Air Products Co., supposed to be located in Chicago. Our office here has been unable to locate them. If you know of their whereabouts I will appreciate receiving this information."

Polaris Belt

Query No. 210—Byers Bros. Pharmacy, 3158 Van Buren St., Chicago, Ill., wishes to obtain a belt suitable for a Polaris machine unit, serial No. 5173.

Refrigerated Display Swells Food Sales for Roadside Diner



Roadside diners have adopted the method of serving foods over counters surmounted with refrigerated display cases, which are also used to display foods. The Brill steel diner shown above manufactured by the Wason Mfg. Co., Springfield, Mass., was recently installed in Providence, R. I. A similar car is being delivered to New Haven, Conn. The cases, which are cooled by electric refrigeration, are being offered as a feature of lunch car equipment.

"PLEASE CHANGE MY ADDRESS"

Recent movements of subscribers as indicated by changes in mailing addresses.

Adams, H. B., from 309 Waters St., to 401 E. Hanna, Tampa, Fla.

Bailey, A. W., from Campbell Ewald Co., General Motors Bldg., to 1450 Pallister Ave., Detroit, Mich.

Baker, Dean F., from 3828 Redford Ave., Sheepshead Bay, Brooklyn, N. Y., to 135 Ardmore Rd., West Hartford, Conn.

Bennett, L. H., from 1026 12th St., to 1212 K. St., Sacramento, Calif.

Boehmer, H. F., from 4419 Forrest Ave., to 4814 Woodland Ave., Des Moines, Ia.

Bradshaw, R. W., from 57 Buffalo St., Hamburg, N. Y., to 775 Main St., Sidway Bldg., Buffalo, N. Y.

Bump, Z. A., from 1741 Michigan, Rt. B, Box 66-A, Fresno, Calif., to 117 N. K. St., Madera, Calif.

Buschman Servel Co., H. W. Buschman, from 6368 Delmar Blvd., to 627 N. Kings highway, St. Louis, Mo.

Buensod, A. C., from 125 W. 12th St., to 1 Fifth Ave., New York, N. Y.

Carrillo Sales Co., from 35 W. Carrillo St., to 18 W. Anapamn St., Santa Barbara, Calif.

Chathams Elec. Co., from 1017 24th Ave. to 1217 27th Ave., Altoona, Pa.

Clark, C. L., from 323 W. Second St., to Box 976, Oklahoma City, Okla.

Cooper, S. R., from 810 Bellemeade, to 2013 Mulberry St., Evansville, Ind.

Creech, F. C., from 323 W. Second St., to Box 976, Oklahoma City, Okla.

Flowing Bowl Corp., from 47 Rodney St. W., Brooklyn, N. Y., to 270 Madison Ave., New York, N. Y.

Friedman, J. M., from 315 N. Michigan Ave., to 161 N. Michigan Ave., Chicago, Ill.

Fuchs, Geo. F., from 3104 Second Ave., Columbia, S. C., to 708 Fourth Ave., High Point, N. C.

Gilbert, Chas. M., from c/o Frick Co., 205 Transportation Bldg., Indianapolis, Ind., to c/o American Ratiator Co., 816 S. Michigan Ave., Chicago, Ill.

Goewey, K. P., from c/o James & Co., Inc., 1723 Pierce Bldg., St. Louis, Mo., to 5424 Cornell Ave., Apt. 216, Chicago, Ill.

Gray, Frank W., from 1512 Broadway, Denver, Colo., to 298 Inghram St., Los Angeles, Calif.

Haupt H. L., from 3710 Main St., to 902 Marshall, Houston, Tex.

Hendy, H. R., from 949 Mission St., to 417 Sutter, San Francisco, Calif.

Huey, J. J., from 323 W. Second St., to Box 976, Oklahoma City, Okla.

Johnson, Chas., from 5422 Fourth Ave., to 432 50th St., Brooklyn, N. Y.

Johnson, C. W., from General Motors Bldg., to Room 1240 Maccabees Bldg., Detroit, Mich.

Johnson, L. F., from Central Minn. Prod. Co., Willmar, Minn., to c/o Johnson Produce Co., Cokato, Minn.

Jones, F. I., from 323 W. Second St., to Box 976, Oklahoma City, Okla.

Keyte, F. C., from 414 E. Second St., Provo, Utah, to West 20th St., Los Angeles, Calif.

King, Frank B., from c/o James & Co., Inc., 1723 Pierce Bldg., to c/o James & Co., Tenth & State Sts., Erie, Pa.

Kissel, W., from 817 Concord St., Pittsburgh, Pa., to c/o Erie Refrigeration Co., Tenth & State Sts., Erie, Pa.

Kopecky Co., F. E., from P. O. Box 999, Cedar Rapids, Ia., to c/o Westinghouse Lamp Co., Third & Elm Sts., Cincinnati, Ohio.

Kortwright, H. G., from General Delivery, to Almus Apts., 1128 S. Third St., Louisville, Ky.

Kramer, A. F., from 803 Fulton St., to c/o Valley Electrical Supply Co., San Joaquin Power Bldg., Fresno, Calif.

Kramer, J. F., from General Elec. Co., 112 North Fourth St., to c/o James & Co., Inc., 827 Planters Bldg., St. Louis, Mo.

Lambert, A. B., from 804 Times Bldg., St. Petersburg, Fla., to c/o Southland Sales, Inc., 503 City National Bank Bldg., Miami, Fla.

Lyons, Paul M., from 844 Dow St., Dayton, Ohio, to 5520 Layola Ave., Apt. 3, New Orleans, La.

McCall, F. E., from c/o Chicago Kelvinator Co., 160 E. Illinois St., Chicago, Ill., to 318 Forest Ave., River Forest, Ill.

McDonald, J. M., from Iron Mountain Co., 939 E. 95th St., to 9438 S. Laflin St., Chicago, Ill.

Martin, E. E., from Box 244, Clinton, Okla., to 1206 S. Ford Blvd., Los Angeles, Calif.

Mathews, A. G., from 618 Main St., Boonton, N. J., to 297 North Drive, Buffalo, N. Y.

Melick, E. W., from 175 Decker Pl., Woodbridge, N. J., to 226 Avondale Ave., Haddonfield, N. J.

Morris, F., from 311 Slair, Ludlow, Ky., to 311 Stokesay, Ludlow, Ky.

National Refrigeration Corp., Atten: Mr. Swyers, Gen. Mgr., from 1226 Main St., to 715 Main St., Buffalo, N. Y.

Oklahoma Gas & Electric Co., from 112 N. Broadway, to Box 1498, Oklahoma City, Okla.

Paschall, R J., from Box 213, Clinton, Okla., to c/o Nash Hardware Co., Fort Worth, Tex.

Patton, J. R., from 1434 Wilshire Blvd., Beverly Hills, Calif., to 1143 Shenandoah St., Los Angeles, Calif.

Pentland, J., from 10 East Ave. N., Hamilton, Ont., to 210 King St., E., Toronto, Ontario, Canada.

Rauh Conrad, from 534 W. 58th St., New York, N. Y., to 2381 Silver St., Ridgewood, L. I., N. Y.

Refrigeration Sales Corp., from 112 E. Fourth St., to 120 E. Fourth St., Jamestown, N. Y.

Roberts, George, from 36 S. 17th St., to 1132 Ridge Ave., Philadelphia, Pa.

Roepcke, Louis, from Alden Manor Apts., Philadelphia, Pa., to 18 W. 70th St., New York, N. Y.

Scott, R. P., from 630 Lycaste Ave., Detroit, Mich., to 740 Kelton Ave., Columbus, Ohio.

Slanger, John, from Leonard Refrigerator Co., to R. R. 4 Knapp Rd., Grand Rapids, Mich.

Smith, I. L., from 1723 Pierce Bldg., 112 N. Fourth St., to c/o James & Co., Inc., 827 Planters Bldg., St. Louis, Mo.

Soad, S. G., from 293 No. Main St., to Electric Lt. & Refrig. Co., 2016 N. Fifth E., Salt Lake City, Utah.

Spurr, Emerson E., from 1037 Tallman, Apt. No. 3, Syracuse, N. Y., to Red Creek, N. Y.

Summers, H. W., from 3551 Gray Ave., Detroit, Mich., to c/o Consumers Power Co., Grand Rapids, Mich.

Tippett, W. M., from 829 S. Citrus St., Los Angeles, Calif., to Dept. 623, Sears, Roebuck & Co., Homan & Arthington Sts., Chicago, Ill.

Vadakin, E. E., from 2040 W. Euclid Ave., to 13260 Littlefield, Detroit, Mich.

Wilson, Wm. Robert, from 714 Parker St., to 2192 First National Bank Bldg., Detroit, Mich.

Woodcox, Vance, from c/o Kelvinator Corp., 14250 Plymouth Rd., to 2958 Monterey, Detroit, Mich.

Wyant, Howard, from Willard Chevrolet Co., 4129 Frankfort Ave., to 338 Gerald Ave., Philadelphia, Pa.

Indianapolis Frigidaire Branch Moves Into New Quarters

New offices of the Frigidaire Sales Corp., Indianapolis, Ind., formerly situated at Monument Circle, were opened on February 25 at 927-931 North Meridian St. The entire building has been remodeled into attractive display rooms and offices. The sales offices are located on the first floor, with the installation and service department and general offices on the second floor of the building, which will be known as the Frigidaire Bldg.

Ebinger To Make Plant Addition

The D. A. Ebinger Sanitary Mfg. Co., of Columbus, Ohio, manufacturers of Ebco water coolers, has awarded the contract for a one-story addition to its plant.

THE CONDENSER

ADVERTISING RATE fifty cents per line (this column only).

SPECIAL RATE if paid in advance—Positions Wanted—fifty words or less, one insertion $2.00, additional words four cents each. Three insertions $5.00, additional words ten cents each. All other classifications—fifty words or less, one insertion $3.00, additional words six cents each. Three insertions $8.00, additional words sixteen cents each.

POSITIONS AVAILABLE

WANTED—High grade refrigeration sales and service representative to call on distributors and dealers in West Coast territory. Direct factory connection. Only high grade experienced men considered. Wonderful opportunity for man of proper qualifications. In reply give complete record of past connections. Address Box 153.

POSITIONS WANTED

FACTORY CONNECTION desired as field representative or zone manager. Five years as distributor, large territory, well known make electric refrigerator. Well grounded experience in sales and field work, domestic and commercial installations. Go anywhere. Address Box No. 151.

COMMERCIAL SALES ENGINEER—Extensive experience with leading machines and their application to various industries is open for engagement. Box No. 154.

MISCELLANEOUS

REORGANIZATION — CAPITAL WANTED. Large Eastern manufacturer of household steel refrigerator cabinets; trade name nationally known; sold to department stores, dealers and manufacturers of electric iceless machines; constant demand during entire year; big profits; get in on the ground floor. Box No. 152.

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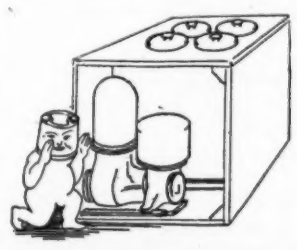

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STOPS those complaints about noise and makes happy dealers. Ice Cream Manufacturers save expensive returns of cabinets to repair shop.
The OWENS SILENCER is attached to the cylinder head in two minutes when overhauling the compressor. It floods the valve with oil and not only quiets the valve but KEEPS it quiet. Positively stops that pounding caused by worn or misadjusted valve stops.
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ELECTRIC REFRIGERATION NEWS

The business newspaper of the refrigeration industry

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FRIGIDAIRE LOSES PATENT SUIT

LOUIS RUTHENBURG MADE PRESIDENT OF COPELAND PRODUCTS

Has Headed Various Divisions Of General Motors Since 1912

WILLIAM Robert Wilson, chairman of the board, Copeland Products, Inc., Detroit, announces the selection of Louis Ruthenburg as president and general manager, effective March 16.

Mr. Ruthenburg comes to Copeland from General Motors interests, having, for the past two years, been vice-president and assistant general manager of the Yellow Truck and Coach Manufacturing Co. and its subsidiaries, the General Motors Truck Corp. and General Motors Truck Co., with headquarters at Pontiac, where he supervised the planning and construction of that company's new eight million dollar plant.

For many years Mr. Ruthenburg was associated with enterprises now part of General Motors interests. He became assistant chief engineer for Dayton Engineering Laboratories Co., manufacturers of Delco starting, lighting and ignition systems, in 1912; was made general superintendent in 1916, and in 1922 assumed the additional duties of manager of the manufacturing division of General Motors research laboratories.

In 1923 he became general manager of the Yellow Sleeve-Valve Engine Works, Inc., of Moline, Ill., a subsidiary of Yellow Cab Manufacturing Co., which position he held until after the merger with General Motors Truck Corp. in 1925.

Mr. Ruthenburg was born in Louisville, Ky. He studied mechanical engineering at Purdue University. His early experience was gained with various American and European companies engaged in motor vehicle development. He is a stockholder and director of the Day-Fan Electric Co., Dayton, Ohio.

"The appointment of Mr. Ruthenburg," says Mr. Wilson, "is a step in the expansion policy planned for Copeland in 1929. While the company has shown remarkable growth in the past and made a profitable record in 1928, all indications point to even greater growth ahead.

"The company's March shipments are showing approximately 40% increase over the same period last year, with unfilled orders on hand almost three times greater than at any equal date in 1928.

PERSONNEL CHANGES ARE ANNOUNCED BY SERVEL SALES, INC.

SERVEL SALES, Inc., Evansville, Indiana, announces the following promotions and additions in the personnel of its sales organization:

Frank P. Shea, formerly district sales manager of district 14, has been promoted to zone sales supervisor of zone E, with headquarters at Cleveland.

Gantt Baggott has been promoted to district sales manager of district 13, with headquarters at Cincinnati. Mr. Baggott was formerly sales department office manager.

William A. Rorison, Jr. has been appointed as assistant in the sales promotion department. He was formerly a member of the advertising department of the Armstrong Cork Co., of Lancaster, Pa.

Lake Jones, formerly with the Tennessee Electric Power Co., Chattanooga, will be placed temporarily in district 11 to assist R. K. Daniel, district sales manager.

John G. Teter, formerly district manager and supervisor of the Maytag Co., Newton, Iowa, will also be assistant to L. G. Daniel in district 12.

W. O. Dunn, Jr., formerly district sales manager of district 25, has been temporarily assigned to district 14, with headquarters at Cleveland.

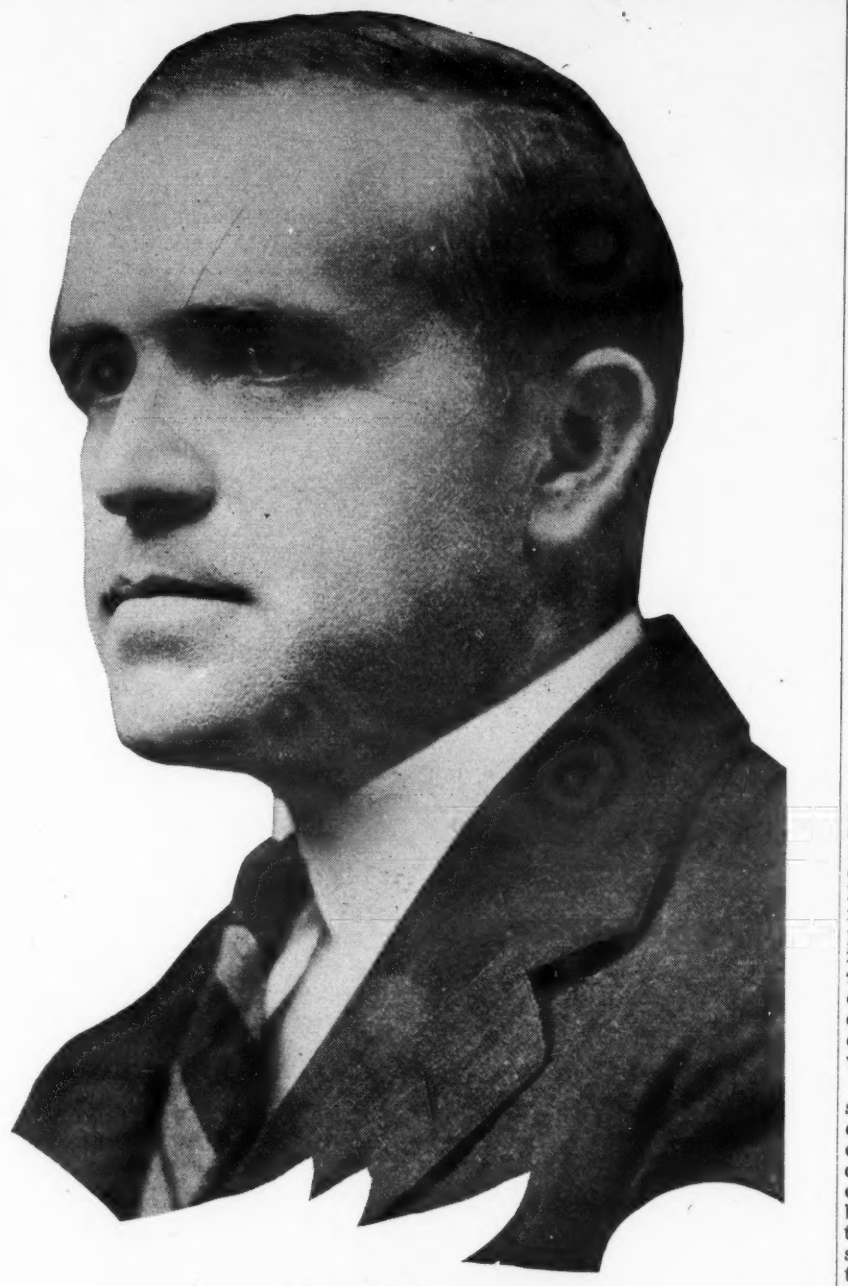
J. W. Crashley, formerly assistant director sales promotion, Standard Gas Equipment Co., of New York, has been permanently assigned as special sales representative in district 17, with headquarters at Chicago.

Ralph A. Hight, previously with Rice Products, Inc., will be assigned as special sales representative in zone E.

C. C. Kemph, formerly with Kelvinator, will be assigned to district 17, as district sales manager.

Albert E. Lee, formerly sales manager for Kelvinator distributors in New Jersey, will be assigned to district 9 as district sales manager with headquarters in Washington, D. C.

Automobile Man Heads Copeland



Louis Ruthenburg

General Necessities Corporation Wins Long and Expensive Legal Battle Involving Basic Features of Domestic Machine

WOLF PATENT DECLARED INVALID PLAINTIFF DROPS OTHER CLAIMS

PATENT litigation involving such important features of the domestic electric refrigerator as air cooling, the assemblage of the motor, compressor and condenser on a common base, the location of the compressor unit underneath the food compartment, and other elements of design being used by many manufacturers of electric refrigeration equipment, was brought to a close Saturday, March 23, when Federal Judge Arthur J. Tuttle in the District Court for the Eastern District of Michigan, at Bay City, Mich., declared invalid patent No. 1337175 originally granted to Fred W. Wolf, April 13, 1920.

The trial of the suit of Frigidaire Cor-Corporation of Dayton, O., Plaintiff vs. General Necessities Corporation of Detroit, Mich., began on Monday, March 18, and continued until Saturday, March 21. This suit involved the patent to H. B. Joy, No. 1502914, dated July 29, 1924, claims 8 and 9, inclusive, covering a shaft seal; the patent to G. A. Kramer, No. 1280765, dated Oct. 8, 1918, claims 3 to 8, inclusive, and patent to Fred W. Wolf, No. 1337175, dated April 13, 1920, claims 10, 15, 16, 18.

The Joy patent was withdrawn by the Plaintiff at the beginning of the trial. After taking some testimony the Kramer patent was also withdrawn, leaving only the Wolf patent in suit.

A disclaimer was filed in respect to claim 10 of the Wolf patent, limiting the same to air cooled condensers composed of a considerable length of tubing made of copper of about ⅛ of an inch in diameter and having a comparatively thin wall. The 15th claim was limited to an air cooled condenser composed of a considerable length of metal tubing of not more than ½-inch diameter and having a comparatively thin wall.

See pages 11 to 23 for a detailed report of the patent trial.

Messrs. Drury W. Cooper and Thomas J. Byrne of Cooper, Kerr & Durham, of New York City, and Harry W. Lindsey, Jr., of Rector, Hibben, Davis & Macauley, of Chicago, appeared for Frigidaire, and George Rex Frye, of Swan & Frye, for the General Necessities Corporation.

Frank L. Sessions, consulting engineer of Cleveland, Ohio, appeared as expert for Frigidaire and H. R. Van Deventer, consulting engineer and patent attorney, appeared as an expert for the General Necessities Corporation, who make the Absopure machine.

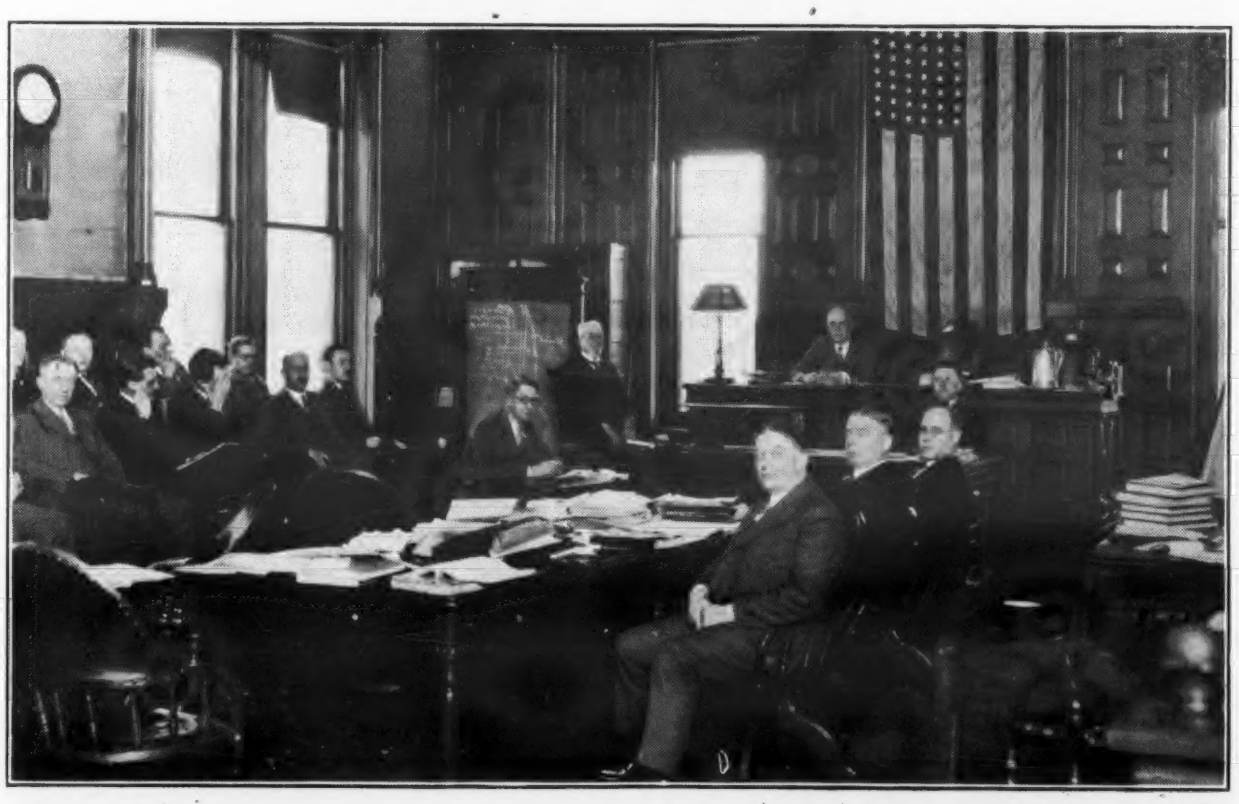
Among the witnesses called were J. Allen Harlan, sales manager of Frigidaire Corporation; Jesse G. King, chief refrigeration engineer of Frigidaire Corporation; J. Ralph Fehr, patent attorney of Frigidaire Corporation; Floyd O. Pansing, assistant secretary-treasurer of Frigidaire Corporation; Harry C. Hayes, chief engineer General Necessities Corporation; Sidney B. Carpender, vice-president and general manager Brunswick-Kroeschell Co., and Cassius C. Palmer, 717 W. 177th St., New York City, a pioneer in the refrigeration industry.

PATENT TESTIMONY GIVES INTERESTING HISTORICAL RECORD OF REFRIGERATION

THE testimony of expert witnesses in the Frigidaire-Absopure patent trial provides one of the most valuable expositions of the physical laws and mechanical problems involved in refrigeration equipment and the most illuminating history of refrigeration development ever recorded. Believing that this data will prove extremely interesting to everyone in the industry, ELECTRIC REFRIGERATION NEWS publishes in this issue a complete record of the first day's proceedings. Additional testimony given during the other five days of the trial will appear in the next issue, April 10.

A limited number of extra copies of a supplement containing the complete proceedings will be available at $1.00 per copy. One thousand typewritten pages comprise the complete record. Important exhibits introduced at the trial will also be reproduced and will require about thirty solid pages of type matter (NEWS size). Copies of regular editions containing this report will be available only to subscribers but new subscriptions starting with this issue will be accepted for a limited period.

Eighty-Three-Year-Old Refrigeration Pioneer Testifies at Patent Trial



Scene in the Federal Courtroom at Bay City, Michigan, Friday morning, March 22, during the patent trial of the Frigidaire Corp. versus General Necessities Corp., when C. C. Palmer, 83, testified regarding the development and production of ten railway cars which were refrigerated by air-cooled equipment. Presiding is Judge Arthur J. Tuttle, renowned for his informal but exceedingly thorough methods of handling intricate legal tangles. At the right are Harry C. Hayes, chief engineer; H. R. Van Deventer, patent expert, and George Rex Frye, chief counsel for the defendant company. At the left of the table are four vacant chairs which were vacated by plaintiff's counsel who refused to sit for the picture. Among the observers at the trial the following are seated in the front row of the jury box: Messrs. Brwinger, Fehr, Ratijaek, King (one of the witnesses), and Swazey. In the back row are Messrs. Williams, Gibson, Schmeding and Hedlund. On the desk of the clerk of the court will be seen a model of a refrigerated freight car exhibited by Mr. Palmer at the World's Fair in Chicago, 1893.

PAPER ON SAFETY HEADS PROGRAM AT NEW YORK A. S. R. E. MEETING MAR. 20

F. E. Matthews was the principal speaker at the meeting of the New York section of the American Society of Refrigerating Engineers, March 20, at the Hotel Pennsylvania, New York City.

Mr. Matthews, chairman of the code committee, read his paper on "Safety in Refrigeration."

Southwestern N. E. L. A. To Hear About Sparklets

A. Edwin Fein, vice-president and general manager of Sparklets, Inc., New York, N. Y., will address the 17th annual convention of the Southeastern division of the National Electric Light Association, which will be held at Grove Park Inn, Asheville, N. C., on May 8-10. Mr. Fein will speak on "Merchandising Psychology" at the afternoon session on May 8.

SPRING SALES MEETINGS

On March 13-14, the F. B. Connelly Co., Billings, Mont., celebrated its silver jubilee anniversary at a meeting of General Electric dealers held in Billings. At that time the new refrigeration salon of the Connelly Co. was officially opened.

APPROXIMATELY 100 General Electric dealers in Montana, Wyoming, northern Idaho and western South Dakota, attended the sales meeting held at Billings, Mont. on March 13-14. In conjunction with the meeting the F. B. Connelly Co., Billings, Mont., distributors of General Electric refrigerators, celebrated its silver jubilee anniversary.

Officials from the electric refrigeration department of the General Electric Co., Cleveland, O., who addressed the dealers and salesmen were W. J. Daily, general sales promotion manager, and F. M. Corliss, of the engineering department. Glenn H. Connelly, B. C. Ritter and W. H. Crawford also spoke at the meeting. On March 14, the Connelly Co. opened its new refrigeration salon in Billings. Souvenirs and refreshments were given to all who visited the showroom. A special section of the Billings Gazette was devoted to the announcement of the celebration of the silver jubilee anniversary of the F. B. Connelly Co., the opening of the refrigeration salon and the dealer meeting. This section contained photographs of officials of the Billings firm and the refrigeration department of the General Electric Co.

NEW ENGLAND MEN HEAR G. E. OFFICIALS AT BOSTON MEETING

APPROXIMATELY 800 General Electric dealers and salesmen in New England territory attended a regional sales conference held by the Electric Refrigerator Co. of New England, Boston, Mass., on March 11. The meeting was held at the Copley Plaza Hotel in Boston and other General Electric distributors who participated in the conference were: Coghlin Electric Co., Worcester, Mass.; Eastern Service Co., Lowell, Mass.; Electric Device Co., Springfield, Mass.; Maine Electric Co., Portland, Me.; Modern Home Utilities, Waterbury, Conn., and Newton Parsons Co., Hartford, Conn.

The morning session was devoted to a special meeting of the dealers and the retail sales organization of the Electric Refrigerator Co. of New England. Charles P. Dow, president, opened the meeting with an address of welcome, after which silver loving cups and other prizes were presented to dealer organizations and salesmen who participated in a sales campaign last fall.

At the afternoon session plans for the spring campaign were outlined. A. C. Mayer, manager of the merchandising service division of the electric refrigeration department of the General Electric Co., Cleveland, Ohio, spoke on the "Treasure Chest." Fred Janvrin, representative of Chambers & Wiswell, advertising counselors, outlined in detail a new sales campaign and the General Electric refrigerator club. E. Newton spoke on "Bringing Out the Facts."

T. K. Quinn, general manager of the electric refrigeration department of the General Electric Co., Cleveland, Ohio, closed the conference with an address at the evening session. He outlined the growth of the electric refrigeration department of the General Electric Co. and discussed sales, advertising and sales promotion plans which have been formulated.

TRUPAR MFG. CO. HOLDS SALES CONFERENCE AT DAYTON ON MARCH 14-15

The Trupar Manufacturing Co., Dayton, Ohio, manufacturers of Trupar electric refrigerators, held its annual sales conference in Dayton on March 14-15. Representatives and distributors from all parts of the country attended this meeting. W. J. Lantz, president of the company, welcomed the visiting men. Other officials who spoke at the meeting were L. G. Lindsay, vice president in charge of sales; W. M. Meyers, sales promotion manager; F. C. Geiler, refrigeration engineer; B. K. Williamson, sales engineer, and H. J. Hunt, vice president in charge of production.

On Thursday the men made an inspection of the Trupar plant. The conference came to a close Friday evening with the annual banquet.

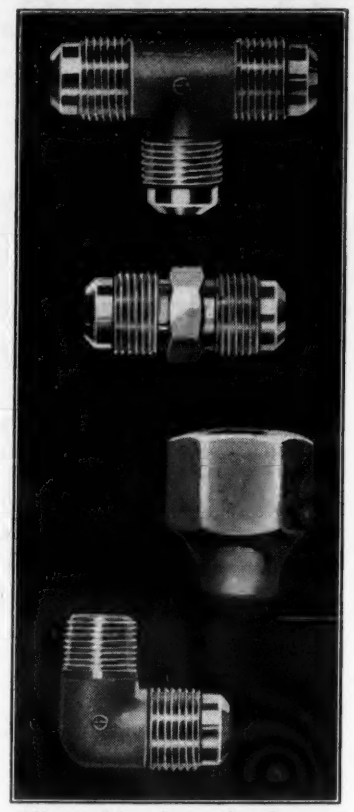
GENERAL ELECTRIC MEN HOLD ONE-DAY MEETING AT SEATTLE ON MARCH 15

Dealers and distributors of the General Electric Co., in the Seattle, Wash., district met March 15 in Seattle for a one-day meeting. The new models were displayed. The meeting was in charge of Gordon Prentice, distributor in the northwestern territory. Speakers at the meeting were George Ruck, Pacific coast manager; W. J. Daily, sales promotion manager; William Crawford, of the auditors department of the factory, and F. M. Corliss, of the factory production department.

Pennsylvania Dealers View New Holmes Models at Scranton Meeting

MORE than 80 electric regrigeration dealers from northeastern Pennsylvania gathered at the Hotel Casey in Scranton, Pa., Wednesday evening, March 6, at the invitation of the D. T. Lansing Co. of that city, recently appointed distributor of Holmes Products, Inc., Bridgeport, Conn. Various models of Holmes electric refrigerators were displayed at the meeting.

D. T. Lansing presided at the meeting and five officials from the New York office of Holmes Products, Inc. were present. John F. Plummer, vice-president, gave the history of the company. John L. Bickel, general sales manager, outlined the development of the Holmes refrigerator. L. K. Baxter, general service manager, emphasized the importance of the operating unit in insuring electric refrigeration efficiency. G. A. Pelling, divisional sales manager, outlined the sales possibilities of the new Holmes unit. H. H. Yaw of Ewing, Jones & Higgins, explained the advertising campaign which has been used to introduce the new machine and discussed the variety of dealer helps which are now available.



All combinations of tube and pipe thread ends can be furnished. All standard sizes and many specials in stock for immediate shipment.

Seep-Proof Tube Fittings

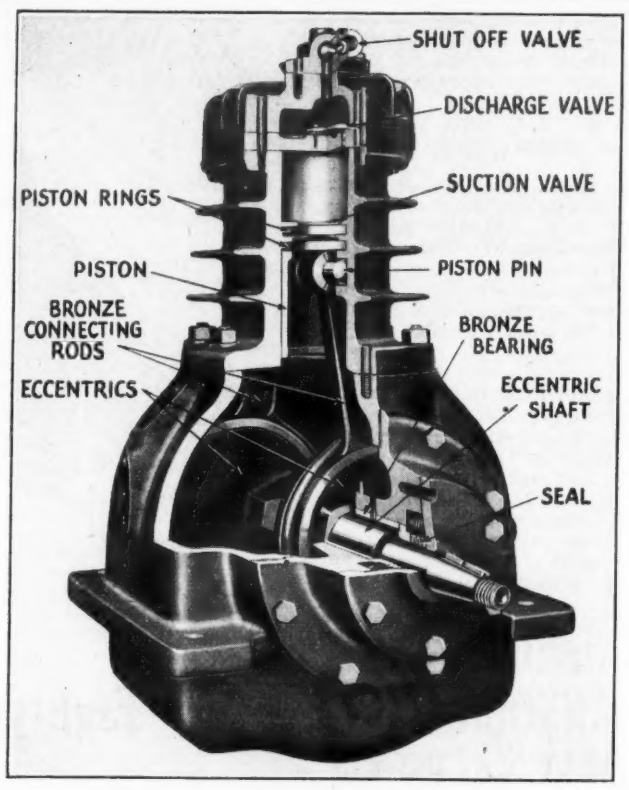
Designed Expressly for the Refrigeration Industry

The Commonwealth line of refrigeration tube and pipe fittings is designed and produced to meet the unusual demands imposed by refrigeration service. The exclusive use of brass forgings and brass rod insures compact grain structure and great tensile strength. These, together with more than usual accuracy and care in machining the seats and threads, provide a quality of fitting that will insure a tight, seep-proof joint for the life of the installation.

If you are interested in the manufacture or installation of automatic refrigerator equipment, ask for catalog R-30, or send complete specifications on "specials."

COMMONWEALTH BRASS CORPORATION
5781 Commonwealth Avenue Detroit

COMMONWEALTH BRASS FITTINGS



IN-BUILT *Quality*

One of the Many Reasons for

ZEROZONE

Amazing Performance

Only the finest materials obtainable are used in the manufacture of Zerozone Compressors. Nothing is skimped—nothing but the best can pass our rigid tests. This coupled with the care we exert in precision manufacturing makes for a marvelous record of efficiency. All Zerozone Compressors give smooth, dependable performance which insures lasting satisfaction, both to the dealer and the user.

Zerozone offers a complete line of Domestic Self-contained Units, Remote Installations, Multiples for Apartments and Commercial Equipment.

There are still a few select territories open for live distributors. Write now for details.

Zerozone *Automatic Refrigeration*

ZEROZONE CORPORATION 927 E. 95th St., CHICAGO

CABINETS BY

Seeger

SAINT PAUL

are being sold with

Zerozone

Automatic Refrigeration

SPRING SALES MEETINGS
(Continued)

SEVEN HUNDRED REX COLE MEN TURN OUT FOR N. Y. CONFERENCE

SEVEN hundred dealers and salesmen of Rex Cole, Inc., New York, N. Y., metropolitan distributor of General Electric refrigerators, attended an all-day conference at Biltmore Hotel in New York, N. Y., on March 21. Spring and summer sales plans were discussed at the meeting and the new all steel General Electric refrigerators were displayed at the afternoon session.

Rex Cole presided at chairman at the meeting and toastmaster at the banquet in the evening. The afternoon session opened with the showing of the all-steel moving picture. F. T. Harvey, direct representative; A. C. Mayer, manager of the merchandising sales division, and L. R. Edwards, manager of the advertising division, all from the electric refrigeration department of the General Electric Co., Cleveland, Ohio, spoke at the afternoon meeting. J. J. Massimi, manager of apartment house sales department; L. H. Jenks, Jr., manager of commercial sales department, of Rex Cole, Inc., and H. J. Francis, General Contract Purchase Corp. were also speakers at the afternoon session.

Matthew S. Sloan, president of the New York Edison Co.; T. K. Quinn, manager of the electric refrigeration department of the General Electric Co., Cleveland; M. H. Aylesworth, president of the National Broadcasting Co., and A. C. Mayer were speakers at the banquet. Other central station officials who attended the banquet were Charles L. Law, of the New York Edison Co., Frank Smith, Joseph F. Becker and Stephin Bennis, of the United Electric Light & Power Co.; C. A. Barton, of the New York & Queen Electric Light & Power Co.; Stuart Wilder and W. A. Root, of the Bronx Gas & Electric Co., and E. A. Holmberg, of the Brooklyn Edison Co.

50 KELVINATOR MEN ATTEND CONVENTION OF LEONARD DIVISION

FIFTY executives and representatives of the Kelvinator Corp., Detroit, headed by H. W. Burritt, vice president in charge of sales, attended a convention held by the Leonard division of the Kelvinator Corp. in Grand Rapids, Mich., March 1-3. The Detroit party inspected the 26-acre plant and viewed the new progressive conveyor method of manufacturing now in operation

The new line of Kelvinator cabinets was inspected by this group of representatives from every part of this country. It was announced that the production at the Leonard plant is now at a high mark. A recent daily production figure of 1,585 refrigerators was given. Shipments during the last week in February averaged 30 cars per day.

Speakers at the convention were A. H. Jaeger, sales manager; A. D. McCaughna, factory manager; Gerald Beld, assistant to the factory manager; R. W. Tyler, service manager, and Earl Lines, advertising manager, all of the Leonard division.

Executives present were as follows: H. W. Burritt, vice-president in charge of sales; R. E. Densmore, assistant to the vice-president; J. S. Sayre, domestic sales manager; R. A. Lundquist, manager export division; H. A. D'Arcy, utilities department; Danner Bierhaus, S. A. Silliman, John Wyllie, Jr., J. M. Fernald, Theo. Slade, W. F. Thorpe, Vance C. Woodcox, commercial sales department; G. E. Rogo, accounting department, all of Detroit.

Kelvinator men who attended the Leonard Refrigerator convention at Grand Rapids March 1-3.

Field managers and representatives were as follows: William C Stephenson, Chicago; J. E. Oliphant, Marion, O.; Fred Foersterling, Chicago; W. E. Tripp, Stamford, Conn.; R. M. Underhill, Long Island City, N. Y.; L. W. Shadburne, St. Louis; C. E. Loman, Baltimore; C. H. Denniston, St. Louis; Nelson S. Gotshall, New York city; William E. Day, Los Angeles; R. A. Wight, Los Angeles; H. L. Percy, Denver; T. S. Edwards, Seattle; H. E. Markland, Detroit; Campbell Wood, Philadelphia; Thomas P. Hallock, Atlanta; H. Troutwine, Boston; George W. Moister, Philadelphia; F. H. Sperry, Clarinda, Ia.; Carl M. Berry, Detroit; J. Latta Jones, Philadelphia; J. K. MacCarthy, Raleigh, N. C.; Thomas H. Maginniss, Chicago; Lester L. Langley, Durham, N. H.; J. K. Johnson and M. K. Johnson, Long Island City, N. Y.; F. H. Weicker, Davenport, Ia.; T. A. MacClenthen, Evanston, Ill.; B. A. Brandon, New Orleans; Calvin D. Mitchell, Charlotte, N. C.; Philip M. Johnson, Boston, and Arden Yinkey of MacManus, Inc., Detroit.

300 G. E. MEN ATTEND SPRING MEETING OF STORZ CO. AT OMAHA

THE Storz Electric Refrigeration Co., Omaha, Nebr., distributors of General Electric refrigerators, held its spring dealer meeting at the Strand Theatre in Omaha on March 5. About 300 dealers and salesmen from the Nebraska and Iowa territory attended the session.

E. J. Nellor, general manager of the Storz Co., presided as chairman at the business sessions. Officials of the electric refrigeration department of the General Electric Co. who spoke at the meeting were Harry Mealy, W. J. Daily, W. H. Taylor, F. M. Corliss. Arthur C. Storz, W. A. Davies, W. J. Higgins and D. A. Kelly, of the Storz Electric Refrigeration Co. also spoke to the visiting dealers and salesmen.

Other officials who attended the meeting were: F. H. Brooks, vice president and general manager, Iowa - Nebraska Light & Power Co., Lincoln, Neb.; C. W. Amidon, president, Central Power Co., Grand Island, Neb.; H. F. Boehner, president, Midwest Refrigeration Co., Des Moines, Ia., and L. T. Reid, president, American Electric Co., St. Joseph, Mo.

Copeland Service Schools Being Held at Factory This Week

Factory service schools are being conducted by the Copeland Products, Inc. at its factory in Detroit this week under the direction of E. Barger, service manager.

MICH. G. E. DEALERS HOLD SALES SESSION IN DETROIT MAR. 19

GENERAL ELECTRIC REFRIGERATOR dealers operating under the Electric Utilities Corp., Detroit, Morley Bros., Saginaw, and C. H. Stull, Grand Rapids, attended the spring sales meeting held at the Book-Cadillac Hotel, Detroit, on March 19. Approximately 200 dealers attended the afternoon business meeting, and about 400, including the wives of many of the dealers, were present at the banquet in the evening.

The afternoon session was opened at 2 o'clock in the crystal ball room by H. A. Turner, chairman, of the Electric Utilities Corp. A. L. McCormick, general manager of the Electric Utilities Corp., gave the welcome address and introduced the speakers of the afternoon. The feature of the afternoon was the announcement of the new all-steel General Electric Refrigerator made by R. H. Ferguson. "Bringing Out the Facts" was the title of a talk by S. S. Carson. H. C. Stewart pointed out the importance of the use of the time payment plan in increasing the sales of General Electric refrigerators, particularly to families with average incomes.

A. C. Mayer, manager of the merchandising service division of the General Electric, electric refrigerator department, Cleveland, drew a round of applause from his audience with his talk which emphasized the necessity of a well directed sales effort. L. R. Edwards, advertising manager, briefly reviewed the 1929 General Electric refrigerator advertising program, on which approximately $5,000,000 will be spent. The afternoon session was closed with the announcement of the new General Electric commercial line by A. R. Green, whose talk was illustrated with slides showing the various models which are to be offered.

A. L. McCormick was toastmaster at the 6:30 dinner in the main ball room of the Book-Cadillac Hotel. Following the dinner A. C. Mayer again held his audience with a story of "How 'Murph' Made His First Sale." P. B. Zimmerman, sales manager of the General Electric electric refrigeration department, Cleveland, gave the address of the evening, emphasizing particularly the opportunity which lies before the electric refrigerator dealer and distributor. Miss Sense, of the Knox Gelatine Company, explained the use of gelatine in the preparation of ice cream in the electric refrigerator. F. M. Cockrell, publisher of ELECTRIC REFRIGERATION NEWS, spoke briefly and indicated the importance of a high type of competition in maintaining public respect for the manufacturers, their representatives and their products.

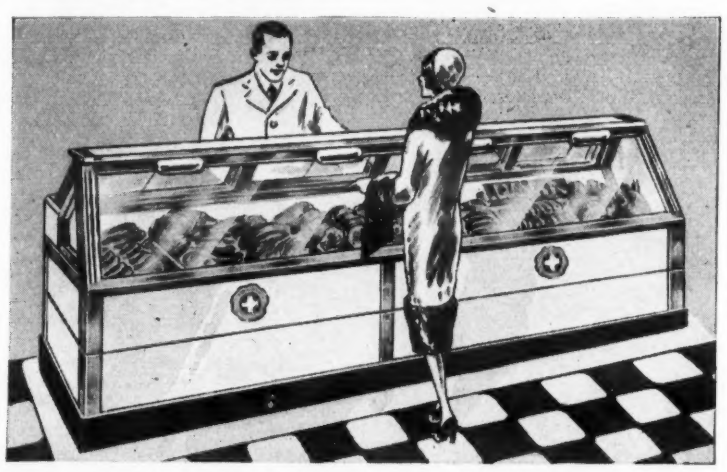
Schedule of G. E. Spring Sales Meetings

Mar. 1—Toledo, Ohio, Chamber of Commerce.
Lake States Gen. Elec. Sup. Co.
Mar. 4—Minneapolis, Minn., Curtis Hotel.
Shannon, Inc.
A. S. Dunning, Inc.
Dakota Refrig. Co.
Lambert & Simpson.
Mar. 5—Omaha, Nebr., Grand Theatre.
Storz West. Auto Supply Co.
Mar. 5—Columbus, Ohio, University Club.
Bard & Barger, Inc.
Mar. 6—Cincinnati, Ohio, Cincinnati Club.
The Milnor Refrig. Co.
F. P. Lutz.
Elec. Home Appl. Co.
Mar. 7—Indianapolis, Ind., Severin Hotel.
Hoosier Elec. Refg. Co.
H. B. McCarty.
Elec. Refrig. Co., Evans.
Mar. 8—Louisville, Ky., Brown Hotel.
Elec. Refg. Co.
Mar. 8—Denver Colo., Shirley-Savoy Hotel.
The B. K. Sweeney Elec. Co.
Mar. 11—Salt Lake City, Newhouse Hotel.
The Frank-Edwards Co.
Mar. 11—Boston, Mass., Copley-Plaza Hotel.
Elec. Refrig. Co. of N. E.
Eastern Service Refg. Co.
Electric Device Co.
Coghlin Electric Co.
The Maine Electric Co.
Modern Home Utilities, Inc.
Newton-Parsons Co.
Mar. 11—Springfield, Ill., Abraham Lincoln Hotel.
Bulpitt Refrigeration Co.
Mar. 12—St. Louis, Mo., Hotel Statler.
James & Co., Inc.
Mar. 13—Billings, Mont., Northern Hotel.
F. B. Connelly Co.
Mar. 14—Little Rock, Ark., Lafayette Hotel.
O'Bannon Bros.
Cahn Electric Co.
Ray H. Boaz Co., Inc.
Mar. 15—Seattle, Wash.
Gordon Prentice, Inc.
Mar. 16—Portland, Ore., Multnomah Hotel.
Arch Electric Co.
Elec. Refrig. Co., Spokane.
Mar. 16—Cleveland, Ohio.
The Cushman Refrig. Co.
The Willis Company.
H. G. Bogart Co.
Mar. 18—Milwaukee, Wis., Hotel Schroeder.
E. H. Schaefer, Inc.
Morley-Murphy Co.
D. S. Stophlet, Inc.
Mar. 18—San Francisco, Elks Club.
L. H. Bennett.
Mar. 18—Jackson, Miss., Edwards Hotel.
A. G. Riddick, Inc.
Mar. 19—New Orleans, La., Hotel Roosevelt.
Woodward, Wight & Co.
Mar. 19—Fresno, Calif., Hotel Fresno.
Valley Elec. Supply Co.
Mar. 19—Detroit, Mich., Hotel Statler.
Electric Utilities Corp.
The C. H. Stull Co.
Morley Bros.
Mar. 20—Buffalo, N. Y., Hotel Statler.
Erco, Inc.
Wheeler Refrigerator Corp.
Mar. 20—Los Angeles, Cal., Jonathan Club.
The George Belsey Co.
George T. Bauder.
Mar. 20—Birmingham, Ala., Own Studio.
Matthews Elec. Supply Co.
Mar. 21—Chattanooga, Tenn., Reid House.
Tennessee Refrig Co.
Mar. 21—New York City, N. Y., Biltmore Hotel.
Rex Cole, Inc.
Mar. 21—Chicago, Ill., Palmer House Hotel.
R. Cooper, Jr., Inc.
Mar. 22—Albany, N. Y., Ten Eyck Hotel.
Page-Morris, Inc.
Mar. 22—El Paso, Texas, Paso Del Norte.
The E. O. Cone Co.
Mar. 22—Atlanta, Ga., Own Institute.
Alexander-Seewald Co.
Mar. 25—Charlotte, N. C., Own Display Room.
Glasgow Refrigeration Co.
Huntington & Guerry, Inc.
Southern Refrigeration Co.
Mar. 25—San Antonio, Tex., Gunter Hotel.
Wright Bros.
Edmunson Refrigerating Corp.
Findlater Refrigeration Co.
Mar. 26—Dallas, Texas, Baker Hotel.
A. C. Rogers.
Reid-Bishop, Inc.
Mar. 26—Richmond, Va., Richmond Hotel.
Commonwealth Refrig. Co.
Lockwood-Embree Sales Corp.
Mar. 27—Baltimore, Md., Lord Baltimore Hotel.
The Hines Company.
National Elec. Supply Co.
Mar. 27—Philadelphia, Benj. Franklin.
Judson C. Burns.
Eastern Hdwe. & Supply Co.
N. K. Ovalle.
Mar. 28—Newark, N. J., Elizabeth Elks Club.
Philip H. Harrison & Co.
Mar. 28—Oklahoma City, Huckins Hotel.
Ahrens Supply Co.
Finklea Electric Co.
Mar. 28—Pittsburgh, Pa., Keystone Club.
Ochiltree Electric Co.
J. E. Spence.
W. N. Hogan, Inc.
Mar. 29—Wichita, Kans., Lassen Hotel.
Johnson Bros. Auto Supply Co.
April 1—Kansas City, Mo.
Glueck & Co., Inc.
American Electric Co.
April 2—Des Moines, Iowa, Fort Des Moines Hotel.
Midwest Refrigeration Co.
Arnold-Ervin Co.

Michigan Distributors Are Hosts to G. E. Dealers

Here it is . . .

NEW Hussmann Quick Service Top Counter . . . with patented Hussmann features . . . new beauty . . . phenomenal performance . . . and engineered to accommodate a standard mechanical refrigeration unit.



The New Hussmann Quick Service Top Counter gets marvelous results heretofore impossible in this type of counter. With a standard mechanical refrigeration unit installed, *it maintains a lower temperature at the front of the case* than where air enters the coil compartment. It provides correct humidity and an ample cold reserve. It controls the temperature and assures positive circulation of air, correct humidity and ample cold.

Beautiful, all procelain finish—non-tarnishable monel metal trim—complete illumination—maximum platter space—heavy corkboard insulation—and many other outstanding features.

You can recommend this counter with perfect assurance that it will meet every demand as a food-saver and money-maker. *Write now* for complete information about our new 5100 line.

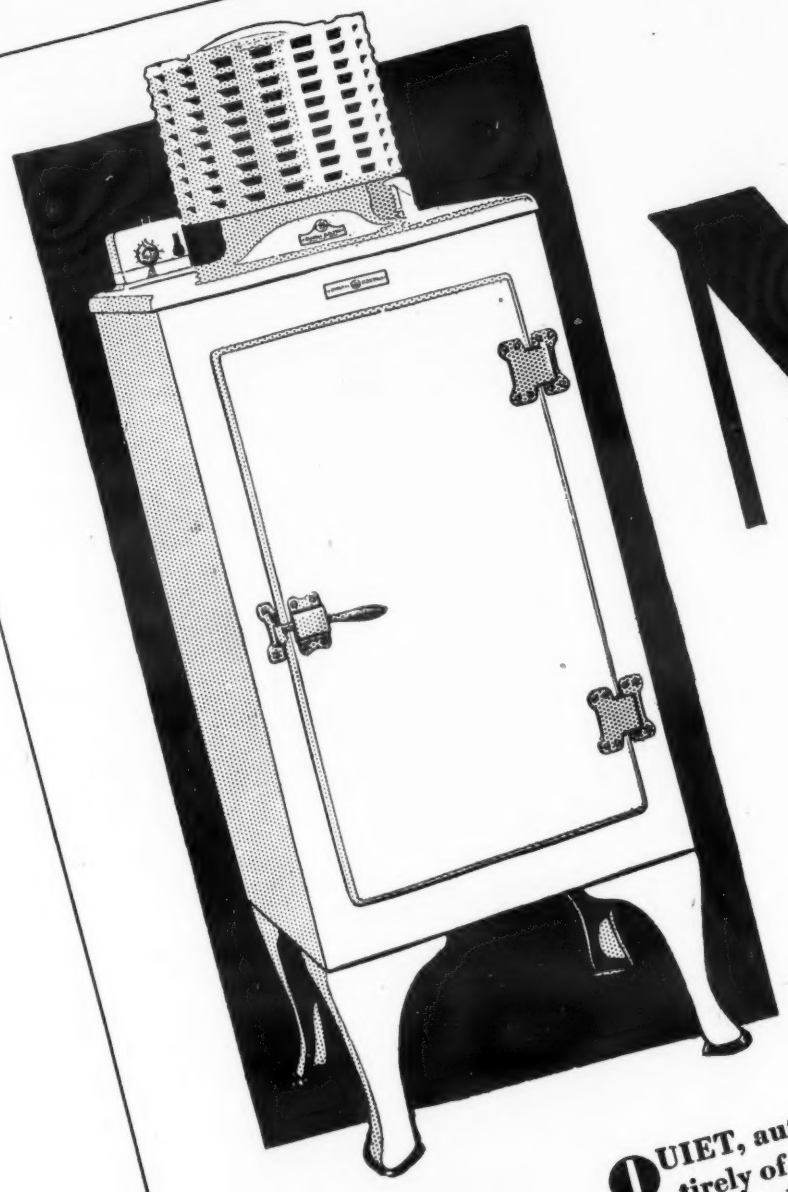
Factories at St. Louis, Mo. (2) Yardley, Pa. Ligonier, Ind.

Sales Offices in all Principal Cities

HARRY L. HUSSMANN
TRADE MARK REG. U.S. PAT. OFF.
REFRIGERATOR DIVISION
HUSSMANN-LIG-O-NIER CO.
909-913 North Broadway, Saint Louis, Mo.

ALL-STEEL

Another outstanding achievement of General Electric Refrigerators which is bringing added prestige and profit to dealers and distributors. This announcement is appearing now in all leading magazines, reaching twenty-three million homes. It is appearing in newspapers throughout the country. Everybody will know at once about this new, all-steel refrigerator.



Now!

A warp-proof moisture-proof

ALL-STEEL REFRIGERATOR

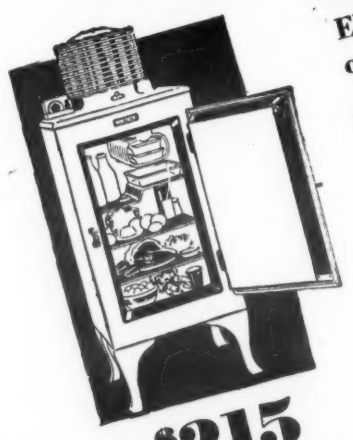
QUIET, automatic, made entirely of steel . . . this General Electric is indeed the "refrigerator of the future"!

The engineers and scientists of the Research Laboratories, having solved the most important problem of electric refrigeration—that of the mechanism—next turned their attention to the designing and building of this infinitely superior, warp-proof refrigerator cabinet.

It is a small-family model, built entirely of steel—as strong as a safe. It cannot warp. All its joints are electrically welded . . . as strong as the steel itself.

The cabinet is finished in a special coating that has all the beauty and sheen of porcelain, but will not crack, chip or check. It has a new type of insulation material, used in exactly the correct amount to maintain correct temperature, well below the 50 degree danger point.

Like all General Electric Refrigerators it has an easily accessible temperature control whereby the user may accelerate the freezing rate of ice cubes when desirable.



$215

at the factory with conveniently spaced payments

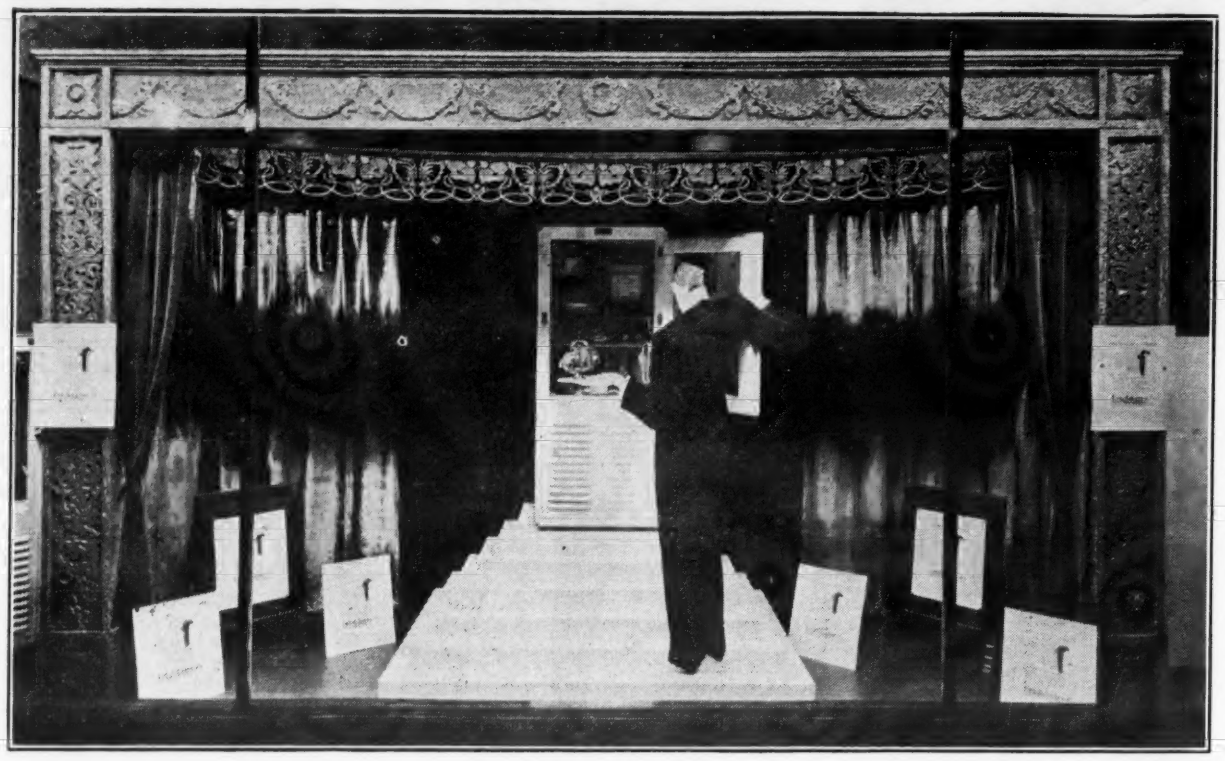
Listen in on the General Electric Hour, broadcast every Saturday evening, 9 to 10 Eastern Standard Time, over the N. B. C. network of forty-two stations.

GENERAL ELECTRIC

ALL-STEEL REFRIGERATOR

REFRIGERATION DEPARTMENT, GENERAL ELECTRIC COMPANY, HANNA BUILDING, CLEVELAND, O.

Poster Display of Frigidaire, Ltd., Ties In With Current Magazine Advertisements



Black and white is the color scheme in this striking display from Frigidaire Limited, London, England. The poster figure, a cut-out, and its position in front of the refrigerator exactly duplicate the illustration in the full-page magazine advertisement, proofs of which are shown on the floor of the window. This policy of duplicating the current magazine advertisement in the design of the window trim will be carried on throughout 1929.

FRIGIDAIRE REGIONAL MEETINGS CONCLUDED

The 1929 series of Frigidaire meetings was brought to a close on March 15-16 with the San Francisco meeting which was held at the Civic Auditorium in San Francisco, Calif. More than 800 dealers and salesmen attended this meeting and it is reported that orders for more than $1,520,000 worth of Frigidaire equipment were turned in at this session by the Pacific coast men.

On March 16, the meeting was closed with a banquet at the Civic Auditorium. R. F. Callaway, manager of branches, in an address said, that sales on the Pacific coast showed a gain of 70 per cent in the first two months of this year as contrasted with a gain of 35 per cent in the remainder of the country. Mayor James Rolph of San Francisco, and A. J. Mount, senior vice president of the Bank of Italy, were among the speakers at the banquet.

Officials of the Frigidaire Corp., Dayton, Ohio, who comprised the official regional convention party which visited nine other cities in this country, made the trip to the west coast. En route the party stopped off and spent a day viewing the Grand Canyon and on March 12, they were the guests of the Los Angeles Chamber of Commerce.

"REFRIGOGRAMS" TO HAVE SEPARATE NUMBERS FOR SERVEL AND ELECTROLUX

Beginning with the March issue, the house organ of Servel Sales, Inc., "Refrigograms" will appear on a twice a month schedule. One issue is devoted exclusively to the Servel electric domestic and commercial line, while the other is planned for Electrolux gas refrigerators. Heretofore both phases of electric and gas refrigeration were contained in the same issue.

The format has been changed to a size 8½ by 11 inches for convenient binding. Each issue will run to eight pages and will contain news of specific installations, as well as items of general interest in the refrigeration industry.

Both sales and service phases will be given equal consideration, according to the sales promotion department, which is responsible for the publication of these house organs. Servel Refrigograms on the electric line will appear on the 15th of each month, while Electrolux Refrigograms for distributors of gas refrigerators is published on the first.

DES MOINES G. E. DISTRIBUTOR'S 1929 QUOTA IS 8,500 UNITS

The Mid-West Refrigeration Co., Des Moines, Iowa, distributors of General Electric refrigerators, has set a quota for 1929 of 8,500 machines, according to H. F. Boehner, president of the concern. The company has a territory of eighty counties in Iowa.

Holmes Appoints Distributor in Springfield, Mass.

J. G. Riga & Sons Co., Inc., 89 Dwight St., Springfield, Mass., has been appointed distributor for the Holmes Products, Inc., refrigerators in Hampden Hampshire and Franklin Counties, Massachusetts. Retail dealers will be appointed throughout the territory.

W. Thode Joins Norge Corp.

William Thode, formerly connected with Servel, Inc., Evansville, Ind., has been appointed special sales representative of the Norge Corp., Detroit.

COPELAND DEALERS AND DISTRIBUTORS IN SALES CONTEST

Eight Loving Cups Offered in Contest Which Started on March 1

ON MARCH 1, Copeland Products, Inc., Detroit, inaugurated a national sales contest among its distributors and dealers. Eight loving cups, valued altogether at $1,000, are offered as prizes and the contest will run throughout the entire year. More than 2,000 Copeland dealers and distributors will participate in this contest.

It all came about as a result of a wager between Edgar McKean, president of the McKean Co., Pittsburgh distributors, and Arthur L. Sullivan, sales manager of Beaudette & Graham, Boston, made at the Copeland sales convention of 1928. They hung up a $100 bet that they would beat each other in volume of sales. Sullivan won by a hair and McKean paid up with a brand new $100 bill at the Copeland convention banquet this year.

Sullivan promptly conceived the idea of a great sales contest in 1929 and offered the $100 with $100 more of his own money as a nucleus. The sum grew quickly until $1,000 had been raised, the other donors being the Seeger Refrigerator Co. of St. Paul, the Dayfan Electric Co. of Dayton, Campbell-Ewald Co. of Detroit, the Belding Hall Refrigerator Co. of Belding, Mich., the H. M. Robins Co. of Detroit and the Copeland Sales Co. of Detroit.

A committee was appointed to plan the contest as follows: A. L. Sullivan, Beaudette & Graham, Boston; J. H. Neebe, Campbell-Ewald Co., Detroit; A. M. Taylor, Copeland Sales Co., Detroit; Lynn T. Piper, Copeland Refrigeration Co., Chicago; A. L. Fink, A. L. Fink Electric Co., Cincinnati; L. S. Wallace, Akron-Copeland Co., Akron, Ohio; P. J. Harrison, Copeland Refrigeration Co., Oklahoma City, Okla.; W. L. Neikamp, Copeland-St. Louis Co., St. Louis; Edgar McKean, the McKean Co., Pittsburgh; W. D. McElhinny, Copeland Sales Co., Detroit; Jack Leonard, Seeger Refrigeration Co., St. Paul; George Campe, George Campe, Inc., San Francisco; C. A. A. Rice, Charles Rice, Inc., Springfield, Mass.; M. H. Moise, M. H. Moise Co., Lexington, Ky.; J. A. Portner, Wheaton, Ill., and P. H. Lehman, Neyhart Hardware Co., Williamsport, Pa.

Loving cups were decided on as prizes with the provision that they are awarded only for the year following the contest and do not become the possession of any winner until they have been won three times by one company, not necessarily three times in succession, however.

Eight groups were decided upon divided into cities of more than a million population, over 500,000, over 250,000, over 100,000, over 50,000, over 25,000, over 10,000 and all towns below 10,000.

Under the plan, also, sales by a dealer located in the same city as his distributor will count for his distributor's score. The basis for scoring was set on the dollar and cents value of installations made prior to the closing date.

THIEVES ATTEND NIGHT SHOWING OF NEW HOLMES

If attracting attention means success, the opening of Gregory V. Rose, Inc., 315 N. Michigan Ave., Chicago, was a success. The night following the opening of the new display of Holmes electric refrigerators, the show room was broken into.

Evidently the task of moving the refrigerators was more than the culprits bargained for and the units were left near the doorway.

The opening of the company was the first public showing of the new Holmes in Chicago. Executives of the Holmes Products, Inc., who attended the opening were John F. Plummer, vice president and general manager; J. M. Bickel, general sales manager, and R. S. Saxton, divisional sales manager.

WILLIAMS OIL-O-MATIC OPENS BIWEEKLY SERIES OF RADIO BROADCASTS

The Williams Oil-O-Matic Heating Corp., Bloomington, Ill., on Feb. 26 and March 1 inaugurated a series of radio programs which will be devoted to Williams products, including the Ice-O-Matic electric refrigerator. On Feb. 26, the Williams Sync-O-Matics took the air over the National Broadcasting Company's network. This program will be given every Tuesday evening over Station WJZ and ten other stations at 10 o'clock eastern standard time.

On March 1, the Williams Mel-O-Matics were heard for the first time from Station WGN in Chicago. This program will be given every Friday evening at 8:30 central standard time.

Portland G. E. Firm Reorganizes and Changes Name

The Arch Electric Refrigeration Co., Portland, Ore., formed by the reorganization of the Arch Electric Co., now occupies new quarters at 194 Tenth St. The new company has taken over the retail business of the Domestic Engineering Co.

The Arch Electric Refrigeration Co. is distributor for General Electric refrigerators in Oregon, western Idaho and the Columbia river counties of Washington.

Capital of the company has been increased to $100,000. Directors are Arch W. Trabert, Guy W. Talbot, L. H. Hoffman, A. S. Moody, and C. H. Gueffroy.

Home Utilities Co., Bridgeport, Opens Store in Springfield

Home Utilities Co., with headquarters in Bridgeport, Conn., has opened a retail store at 206 Worthington St., Springfield, Mass., for the sale of the Electrolux refrigerator. C. H. Greene is manager.

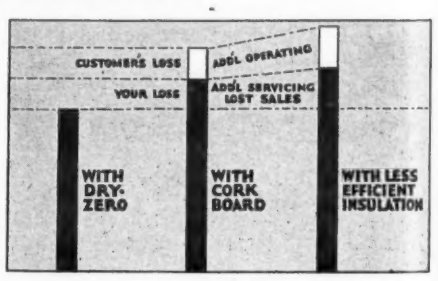
Westport, Conn. Distributor Opens Branch at Fairfield

The Curley Radio & Electric Co., has been established at 671 Post Road, Fairfield, Conn., as a branch of the Curley Co. at Westport. The Fairfield store will take care of the distribution of General Electric refrigerators in that territory.

The amount of ice cream produced in the United States during the first three months of 1928 was approximately 31,432,000 gallons.

Dry-Zero *insulated cabinets reduce the running time of your machine* 15 per cent

and eliminate troublesome insulation odors



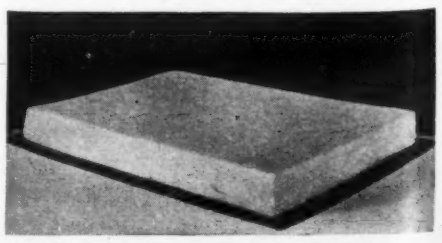
..reduce servicing costs..and preserve the mechanism over a longer period of time.

..And in addition Dry-Zero insulated cabinets are free from troublesome insulation odors. Dry-Zero is absolutely odorless. It is one of the cleanest, most sanitary insulants in existence. Its resilient glass-like fibres resist deterioration..and will not absorb moisture. Dry-Zero will not rot or disintegrate during the entire life of the unit.

These are real selling points. Your refrigerating unit..no matter how fine it may be..will be more efficient in its operation

CORRECT cabinet insulation is the vital factor in the efficient operation of an automatic refrigerating unit. You could have the finest piece of machinery ever created by mechanical genius..but you wouldn't have a satisfactory refrigerator until you put it in a box *that kept heat out*. Even in an ordinary small sized unit insulated with 2 inches of the material that most nearly approaches Dry-Zero, *80% of the heat entry* is through the walls. It means wear..tear..and unnecessary running time to remove that heat.

Because of the admitted greater insulating efficiency of Dry-Zero..20% to 40% more heat-resistant than any other insulant in common use..Dry-Zero Insulated Cabinets actually reduce the running time of the machine 15%. They increase the efficient performance of the unit

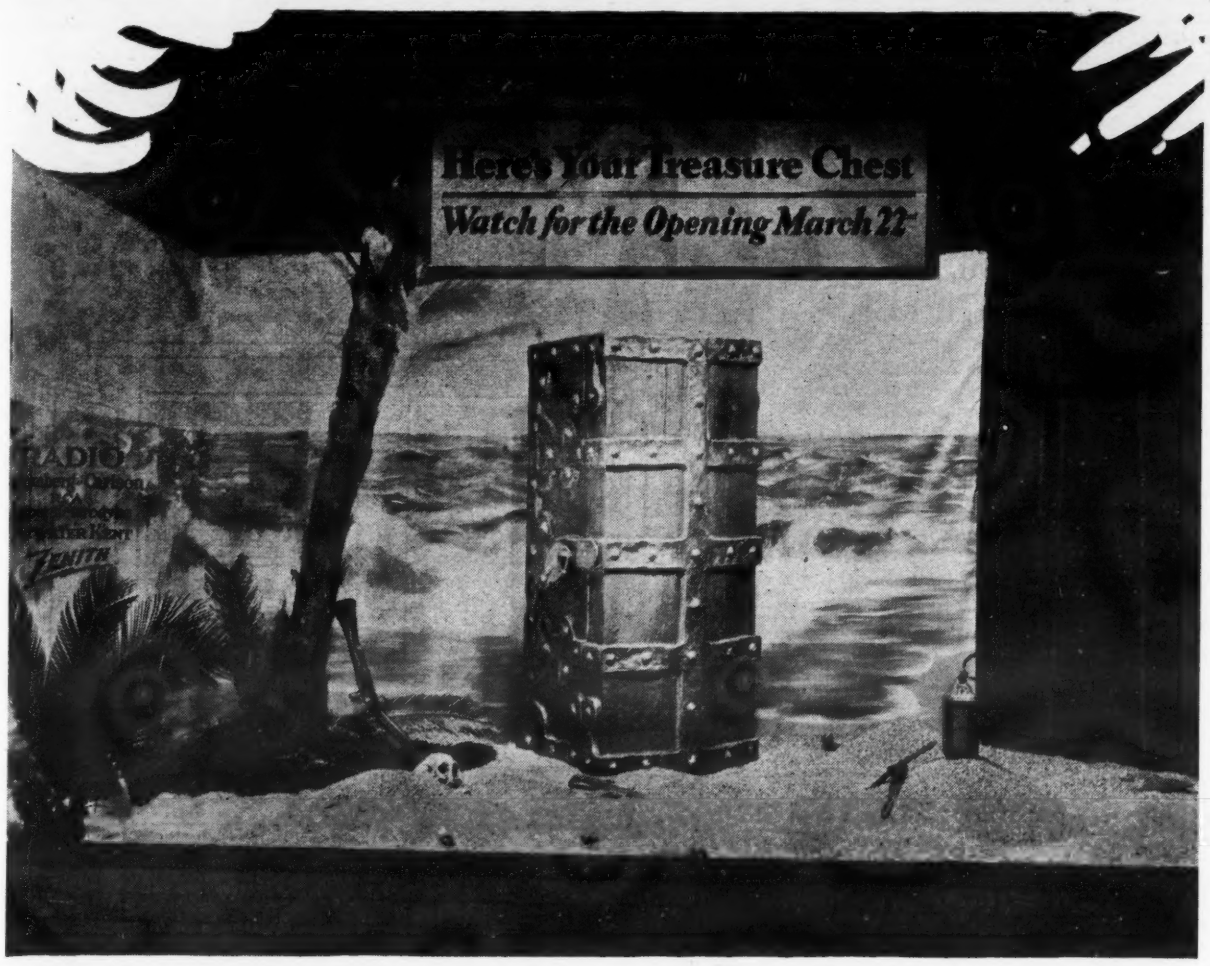


..more lasting in its satisfaction ..noticeably more reasonable to run..when running under the ideal conditions existing in a Dry-Zero insulated cabinet.

Dry-Zero Corporation
130 N. Wells St.
Chicago, Ill.

DRY·ZERO

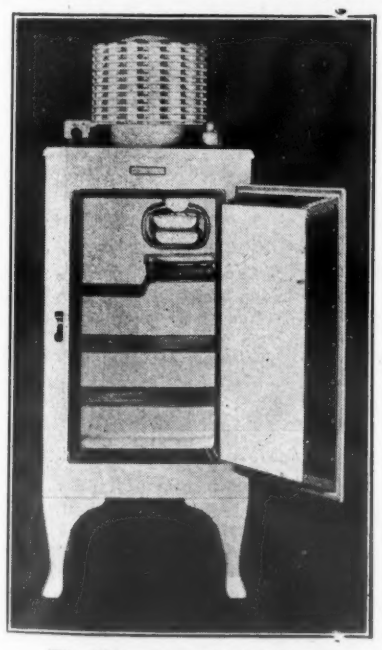
Romance of Pirate Days Adds Colorful Touch to Announcement of New G. E. Model



A treasure chest reminding one of the picaresque days was used in the display of the Cable Nelson Co., Kalamazoo, Mich., preceding the announcement of the new General Electric model. A blunderbus, Arabian dagger and flintlock pistol, cutlass, broadaxe, Indian skull and human bones borrowed from an antique dealer added atmosphere to the scene. An overall cast of blue from the flood-lights above and spotlights of green and amber concentrated on the chest were used to bring out the gold.

GENERAL ELECTRIC ANNOUNCES THE NEW ALL STEEL MODEL

A NEW all-steel refrigerator of a size suitable for apartments and small homes was announced to the public through national advertising by the General Electric Co., Electric Refrigeration Dept., Cleveland, O., on March 21. The new model is presented as the first all-steel electric refrigerator, the joints being electrically welded and the hardware being firmly joined to the steel body.



The New G. E. Model G-4(

Detailed specifications on the new model appear below:

Food Storage Capacity: 3½ cu. ft.
Food Shelf Area: 6½ sq. ft. Straight wire shelves.
Ice Making: 48 cubes in two pans.
Exterior Dimensions:
Height—51 7-16 in. overall, cabinet and unit only.
Height—63¼ in. overall, cabinet and unit with 11 3-8 in. legs.
Width—24 in.
Depth—21 532 in., cabinet alone.
Depth—23 9-16 in., cabinet over hardware.
Icing Unit (DR-1) 1-10 h. p. single phase induction type. All moving parts enclosed in hermetically sealed casing.
Cabinet:
Exterior—Sanak finish, Detachable legs.
Interior—White Porcelain.
Weight:
Unit—141 lbs.
Cabinet—233 lbs.
Shipping Weight:
Unit—178 lbs.
Cabinet—334 lbs.

DOLE ADDS 1 1-2 TON UNIT TO ITS COMMERCIAL LINE

The Dole Refrigerating Machine Co., 1209 Washington Blvd., Chicago, Ill., announces that a twin cylinder 1½ ton "D" model machine has been added to its line of condensing units

Walla Walla Firm Gets Electro-Kold Distributorship In Washington

Davis-Kaser Co., Walla Walla, Wash., have been appointed Electro-Kold distributors for the south central Washington territory. C. A. Harvey has been placed in charge of their refrigeration department.

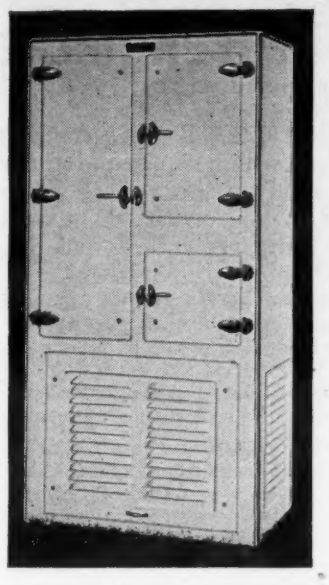
Northampton, Mass., Dealer Shop Increases Display Space

The Parsons' Electric Shop, conducted by W. A. Parsons at 191½ Main St., Northampton, Mass., has expanded by adding the ground floor store at 191 Main St. to its second-story establishment. This provides a show window that is utilized principally for display of General Electric refrigerators.

The Poster Announcement

A National Acceptance

The gratifying reception that has been accorded the NEW BOHN SANITOR series is undoubtedly due to its low price — but by no means to price alone, for in every detail of its construction BOHN standards have been adhered to rigidly. Here is a super-quality, all-porcelain refrigerator that is as beautiful in appearance as it is efficient in service. Quantity production brings its price within the reach of the majority of families in your community.



These models together with those of the other famous BOHN Lines combine to make a group of refrigerators that answer every requirement in style, size and price.

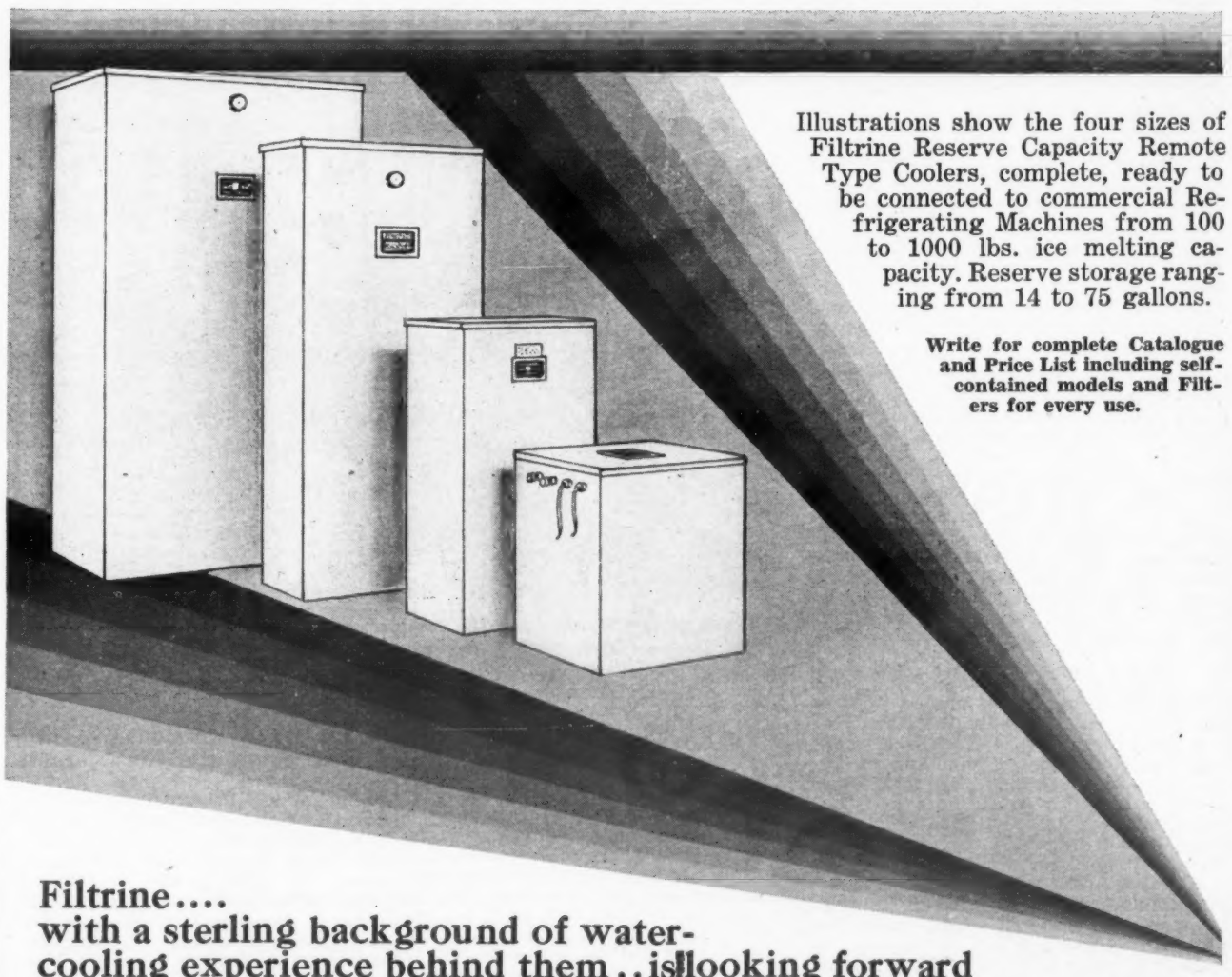
Our catalog gives complete information and it is yours for the asking.

Nothing finer can be said of a refrigerator than "It was built by BOHN."

BOHN REFRIGERATOR COMPANY
SAINT PAUL, MINNESOTA

NEW YORK CHICAGO BOSTON

NOW...! Filtrine Water Coolers for 1930.....presented in 1929.



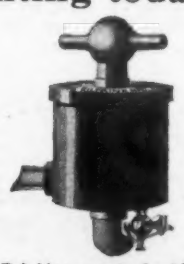
Illustrations show the four sizes of Filtrine Reserve Capacity Remote Type Coolers, complete, ready to be connected to commercial Refrigerating Machines from 100 to 1000 lbs. ice melting capacity. Reserve storage ranging from 14 to 75 gallons.

Write for complete Catalogue and Price List including self-contained models and Filters for every use.

Filtrine....
with a sterling background of water-cooling experience behind them..is looking forward ---a full year ahead!..presenting today, the cooler of tomorrow!

Amazingly simple in design and construction . . . yet staunch and sturdy . . . foolproof and trouble-proof. Factory approved by Servel, by Kelvinator, by Welsbach.

Their handsome cabinets and their super-reserve capacity make them ideal, OUTSTANDINGLY PREFERABLE . . . for restaurants, hotels, theatres, for circulating systems . . . in fact, for EVERY water-cooling need.



Drinking water should be clean and clear as well as cold. Model 3 Filter, suitable for use with the following coolers: Servel, Kelvinator, Welsbach, Frigidaire, General Electric, etc. is priced at only $15.

FIELD REPRESENTATIVES — There are still desirable territories open to men that understand the sales possibilities in Filtrine Water Coolers and Filters. Write or wire today!

FILTRINE MANUFACTURING CO.
53 LEXINGTON AVE. BROOKLYN, N. Y.
MANUFACTURERS OF COOLERS AND FILTERS OF ALL SIZES

Food Should Be Placed in Refrigerator According to Its Temperature Requirements

DIFFERENT foods have varying refrigeration requirements, all of which can be cared for in a good refrigerator. Temperatures in a good refrigerator should not be over 50 degrees in the large food compartment with an outside temperature of 75 degrees and the milk compartment not exceeding 45 degrees with outside temperature at 90 degrees. These conclusions are given in a pamphlet "How to Use a Good Refrigerator," by M. E. Pennington, published recently by the Household Refrigeration Bureau of the National Association of Ice Industries. General principles of satisfactory construction of an ice refrigerator are given.

It is advised that cream not be poured off the milk until ready for use because being at the top of the milk bottle, it is colder than placed in a shallow container in the same compartment. It is emphasized that cream is the most perishable food kept in a refrigerator, that pasteurized cream develops bad odors and unpleasant tastes, and unpasteurized cream sours quickly. Any food containing cream should have the same attention that cream would receive. Delicate meats combined with cream, as creamed chicken, is extremely perishable.

In discussing meat broths and purees, attention is called to the fact that beef bouillon is used by the bacteriologist in culturing bacteria. It is suggested that meat broths be sealed when boiling hot, as canned fruits are sealed, and then kept in the coldest part of the refrigerator.

Butter Should Be Covered

Butter is given as one of the foods needing strict refrigeration until consumed. It is explained that when butter softens, or becomes warm, it quickly develops an off flavor, or, is "rancid," which means that bacteria have caused the fat to decompose. Butter should be kept in the carton in which it is bought or in a tightly covered dish on the floor of the small food compartment.

Difference in the decomposition of poultry foods is given as, one, the breaking down of proteins, the others, the decomposing of fats. It is pointed out that the decomposition of fats may be due to enzymes as well as bacteria, but low temperature slows down activity in either case. Temperatures recommended for the care of poultry are 32 degrees in chill room at packing house, 40 degrees in the refrigerator car, 40 degrees in the cooler of the poultry jobber or wholesaler, below 45 degrees in the retailer's box, and not over 47 degrees in the home refrigerator.

Meats differ from poultry in having open surfaces which offer little resistance to the entrance of organisms, although meat foods are more resistant to decay than poultry. Meat should be dry when placed in the refrigerator so that the circulation of air will quickly dry the outer surface of the meat, forming a thin film of dry meat. Temperature at which meat may safely be held in the home refrigerator is given as 48 degrees. Such meats as sweetbreads, liver, split lamb kidneys, and pork loins should be cared for the same as poultry.

Fish Require Close Attention

Fish which have been packed in fine ice should not be kept in the home refrigerator more than 24 hours. Fish may easily be contaminated from bacteria on fins and on head and therefore it is better to get fish which have had the head and fins removed. Fish should be dried before placing in the refrigerator. Frozen filleted fish can be kept in the refrigerator beside the butter without contaminating it. The frozen fish is skinned while perfectly fresh, washed in running water, boned and packed in cartons in which they are sold, and frozen immediately at 50 degrees below zero.

All salad materials may be kept in one container in the refrigerator. Celery, lettuce, parsley, water cress, tomatoes, cucumbers and radishes may all be kept together. The salad jar should be placed on the floor of the large food compartment.

Fruits do not require as low a temperature as meats and milk but all fruits with the exception of apples, oranges, and grapefruit should be kept at a temperature below 50 degrees. In caring for berries it is advised that the fruit be removed from the boxes in which they were packed and any showing indications of softening or mold developments removed. The sound berries should be placed in a shallow container which permits easy access to the entire mass. Such fruits should not be washed, nor hulls removed from strawberries, until ready to serve.

Apples and melons should be placed near the top of the refrigerator because of their odor. Melons should not be served filled with chipped ice because it dilutes the juice, but rather should be served on a bed of chipped ice. Apples do not become shriveled when kept in the refrigerator.

WISCONSIN G. E. MEN HOLD SPRING SALES MEET AT MILWAUKEE

GENERAL Electric refrigerator dealers and salesmen in eastern and southern Wisconsin operating under the Wisconsin Electric Refrigerator Co., Madison, E. H. Schaefer Corp., Milwaukee, and the Morley-Murphy Co., Green Bay, all distributors of General Electric refrigerators, attended a spring sales meeting which was held at the Hotel Schroeder in Milwaukee on March 18. About two hundred men attended this conference.

A. C. Mayer, manager of the merchandising service division; W. M. Timmerman, commercial specialist, and W. H. Taylor, district representative, of the electric refrigeration department of the General Electric Co., Cleveland, were the principal speakers at the meeting. In addition, D. S. Stophlet, president of the Wisconsin Electric Refrigerator Co., D. E. Breckenridge, sales manager of the E. H. Schaefer Corp., and C. E. Callan, of the Illinois Contract Purchasing Corp. spoke to the dealers and salesmen.

SERVEL ACQUIRES LARGE PLANT IN EVANSVILLE

Servel, Inc., Evansville, Ind., announces the purchase of the factory and equipment of the Bockstege Furniture Co. in Evansville, valued at approximately $500,000. This plant is located at Franklin and 7th Sts. and contains 113,000 sq. ft. of floor space, which will provide increased facilities for Servel and Electrolux production. These facilities were acquired to take care of the large increase in orders which have made necessary the expansion of the plant.

NELSON, CHIEF ENGINEER OF NORGE CORP. RESIGNS

Roy G. Nelson, chief engineer of Norge Corporation, Detroit, has resigned, effective May 1. Mr. Nelson has been with Norge for three and one-half years and was previously with Kelvinator Corporation, Detroit, and Fedders Mfg. Co., Buffalo, N. Y.

Pupils Given Demonstration of Electrolux Refrigeration

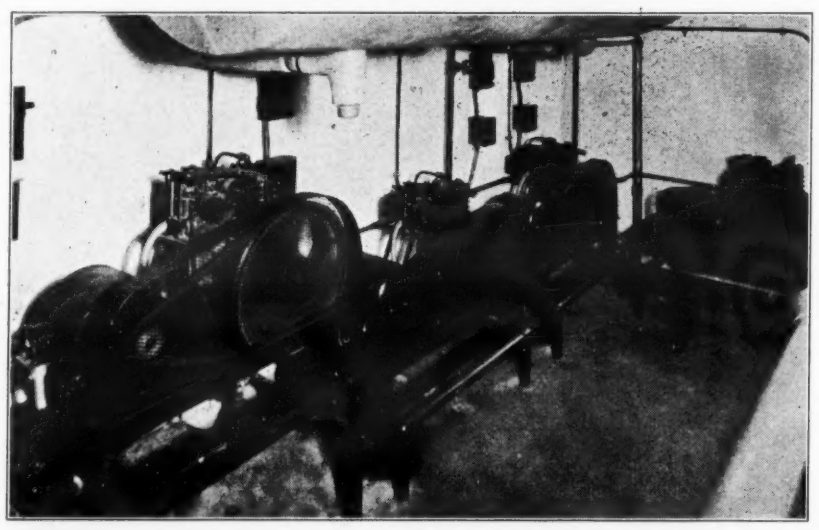
Science pupils of the Polytechnic Preparatory Country Day School, Brooklyn, N. Y., were given a demonstration of the Electrolux refrigerator recently, by Patrick Griffin, Servel Sales, Inc., New York City.

Mr. Griffin conducted two physics classes at the request of Malcolm C. Spence, head of the school's science department. Colored lantern slides were used with the talk and time for questions was allowed after the talk. The pupils showed a quick grasp of the principle and asked intelligent, practical questions, Mr. Griffin said.

Western Radio Co. New Seattle Frigidaire Dealers

Western Radio Co., 6603 Tenth Ave., N. E., Seattle, Wash., has been appointed Frigidaire dealers. W. N. Turner is proprietor of the company.

Frigidaire Makes Installation in Detroit Hospital



The picture above shows the compressor room in the basement of Providence Hospital, Detroit, and the installation made by the Detroit Frigidaire branch.

REORDERS BY BUILDERS ARE BIG ITEM IN NEW YORK FIRM'S SALES

August Rathemacher, director of gas refrigeration sales, Consolidated Gas Co., New York, says 1929 business will exceed by far that of 1928. He bases this on the fact that builders who installed gas refrigeration during the first year the company held the distributorship, have repeated those orders for other buildings.

Approximately a thousand Electrolux refrigerators were sold in this way in 1928. One builder alone after installing 147 units in an apartment in 1927 reordered 120 at one time, 126 at another time and made specifications for gas refrigeration in more than a hundred homes in suburbs.

ROCHESTER UTILITY REPORTS 11.5% GAIN IN COMMERCIAL REFRIGERATION SALES FOR 1928

The gross sales of commercial refrigeration during 1928 by the Rochester Gas & Electric Corp., Rochester, N. Y., amounted to $28,766, or an increase of 11.5 per cent over the sales for the preceding year. Of these sales, 32 per cent were for equipment used in markets, 13.5 per cent were in the ice cream industry, 9 per cent were for restaurant boxes, 6.8 per cent for institutions and 9 per cent for stores and bakeries.

The sales for the year total 45, and their total estimated annual revenue amounts to $2,880.

Salad Greens Should Be Tightly Covered in the Refrigerator

Salad greens, if kept in the refrigerator for more than a day should be placed in a tightly-covered dish, experiments by the Good Housekeeping Institute disclosed. If crisp lettuce, romaine, and other ingredients are to be kept for only a day, a damp lettuce bag is sufficient. Mayonnaise dressing was found to be satisfactorily kept only in the warmer part of the refrigerator. When kept in the colder part, home-made mayonnaise will often separate when removed into the warm room.

LASSEN — TEMPERATURE — PRESSURE — CONTROLS
POSITIVE RANGE AND DIFFERENTIAL ADJUSTMENT
NON-DETERIORATING MERCURY TUBE SWITCH—MEET ALL REQUIREMENTS
GOODNOW & BLAKE MFG. CO. 3840 BEAVER STREET DETROIT, MICH.

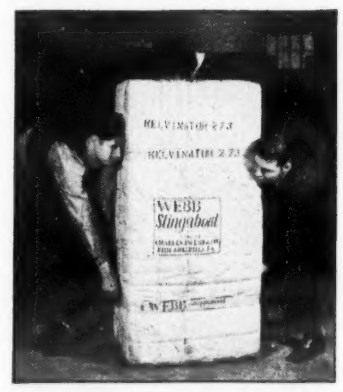
Wayne
Electric Refrigerator

BY sheer merit alone—the Wayne Electric Refrigerator will help you serve many thousands of homes with carefree, economical refrigeration.

AND our definite sales aid rendered to every dealer, and salesman—makes Wayne's franchise invaluable—and profitable! Full details—about Wayne Electric Refrigerators—and Oil Burners—sent on request!

WAYNE HOME EQUIPMENT CO.
Main Office and Factory, Fort Wayne, Ind.

There are no 2 ways
about it . . . *the Webb Slingabout will write more refrigerator profits in your ledger*



EFFICIENT management looks to increase profits by cutting down on expenses as much as by enlarging sales. Dealers have found that the Slingabout cuts a large slice off delivery costs.

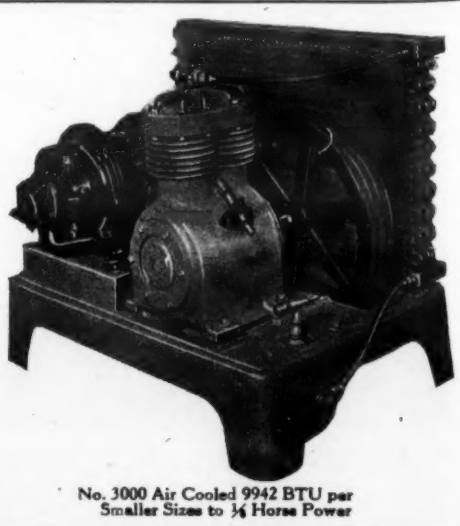
Faster deliveries, time and labor saved . . . cleaner deliveries, to increase consumer good-will and save the cost of cleaning up . . . property damages saved by its thick-padded, resilient jacket . . . and unintentional, careless scratching and marring of the high-finished surfaces of refrigerators done away with by its soft flannel lining—*these are some of the Slingabout's advantages.*

It will pay you in dollars and cents to equip your service force with Slingabouts.

Just tell us what line you handle and we will quote you prices. The Charles J. Webb Company, 1116 Chestnut Street, Philadelphia, Pa.

Webb Slingabout

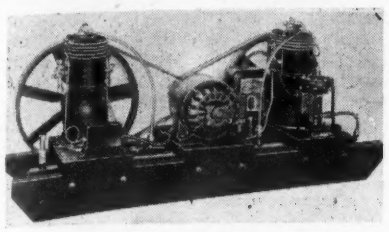
KULAIR COMMERCIAL CONDENSING UNITS
For Use With Any Practical Cooling Unit
Low, Medium or High Speed
Multiple or Single Unit Hookup
Sulphur Dioxide or Methyl Chloride
A sensible policy product and price
Awaits your inquiry
Write for it
KULAIR DIVISION
FRANKLIN AIR COMPRESSOR CORPORATION
NORRISTOWN, PA.



No. 3000 Air Cooled 9942 BTU per
Smaller Sizes to ¼ Horse Power

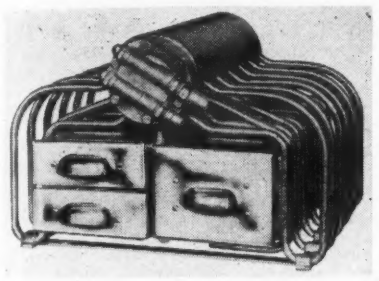
ELECTRO-KOLD LINE FEATURES 5 CU. FT. HOUSEHOLD MODEL

THE Electro-Kold Corp., Spokane, Wash., announces that its household line has been completely rearranged this year, having as the leader model the 51-EU unit which is made in several styles for household and apartment installations. This model has 5.1 cu. ft. of food storage capacity and 7½ sq. ft. of shelf area. Exterior finish is white lacquer and interior finish is white enamel.



Twin AA Condensing Unit

All compressor units have the new rubber suspended compressor bases to insure quietness and freedom from vibration. The twin AA compressor unit for commercial installations is equipped with 1½ h.p. motor. It is a water cooled unit and has ice melting capacity of 1,000 lbs. per 12 hours of operation.



Model E-16 Frost Unit

All frost units have been made direct expansion type and the commercial line includes the fin type direct expansion unit and the cross fin type. No. 55 frost unit for apartment multiple installation has two trays, 18 cubes in each. Nos. E-6 and E-16 for household models have ice cube capacities of 45 and 84 cubes, respectively.

HOUSE COOLERS TO EFFECT SOCIAL AND ECONOMIC CHANGES

(Reprinted from the *Chicago Tribune*)

A cooler for houses that will take ten degrees from the temperature in half an hour is announced. Cooled houses, offices, factories, clubs may soon become a commonplace. A combined heating and cooling system, including food refrigeration, will next be demanded.

The reach and future of the cooling machine well may be great. With artificial cooling on a practical basis a new field for human expansion probably will be opened, and what the temperate zones were to men moving northward with fires the tropic zones may become for men with artificial coolers. With his coolers the white man may populate the torrid areas as he now populates Europe, and continental regions closed for the general purpose of living will be opened to civilization.

The refrigeration of foods has transformed the eating habits of the western world within the last century or so, and with that transformation came a correlated transformation in commerce and in living habits. By cooling food the products of all lands are brought to the dinner table. By cooling people and their houses new migrations will be possible and the races of the north no doubt will betake themselves in great numbers to the empty torrid zone. Refrigeration of houses will result in social and economic changes almost beyond estimate. The house cooler may become accountable—and this is not entirely fantastic—for great migrations southward.

When as much attention and energy are given to cooling the tropics and combating their pests as now are given to heating the temperate zones the tropics will be a suitable abode for billions of the northern stock.

SERVEL OFFERS PRIZES FOR BEST SINGLE SALES POINT AND PRESENTATION

A "pick-your-own" prize contest has been announced by Servel Sales, Inc., open to all employees of both Servel and Electrolux dealers. A total of $1,400 worth of prizes are offered for the best written sales presentation of either Servel or Electrolux refrigeration and also for the best single sales point.

A variety of merchandise prizes has been selected for the winners in the contest. The entries will be classified into two divisions, Servel and Electrolux, with thirty-six prizes for each classification. Furniture, jewels, sporting goods, and other articles are available.

March 31 is the final date for all entries. There will be four first prize awards amounting to $200 each in merchandise. Second prizes are valued at $50, third at $10, and fourth at $5.00 each.

REFRIGERATION IS FREE UP ABOVE

Two army fliers, trying for the altitude record, at 40,000 feet abandoned the attempt, fuel lacking. At that height the temperature was 76 below zero. A fact important to future fliers, carrying perishable ripe fruits and other goods needing refrigeration.

The flier will take his freshly picked ripe peaches, strawberries or avocados on board in Florida, California, Louisiana or anywhere on the Gulf Coast, rise in the air, watch his thermometer, fly to his market and descend with fruits picked ripe, covering the journey at exactly the right temperature, no expense for refrigeration.

The future may see giant airships carrying meat from New Zealand and Australia to London, depending entirely on upper air refrigeration.—*Detroit Times.*

INDUSTRY DEMANDS MORE TRAINED MEN

Further evidence that the electric refrigeration industry has entered on what promises to be its biggest year, is seen in a report recently received from the Utilities Engineering Institute, 3120 North Clark St., Chicago, stating that more calls for trained men are coming in than they are able to fill.

According to E. P. Sorensen, president of the school, employers in every section of the country are asking for men with a sound knowledge of electric refrigeration for sales, production, installation, servicing and other positions "We're doing our best to meet this demand," says Mr. Sorensen, "but we are finding it harder and harder to do so. We realize that it is up to us to develop capable, trained men and we are doing our utmost.

"The leading manufacturers and distributors are co-operating with us to the limit. In fact, a number of them, such as Kelvinator Sales Corp., Servel Sales, Inc., Copeland Sales Co., and others, are recommending our course to their employees in order to increase their working efficiency. Quite a few of these employees are already enrolled."

LOW TEMPERATURES HAVE EFFECT ON COOKING TIME

That unusually low temperatures affected the cooking time of meat was found in the Delineator Home Institute. Meat kept in a refrigerator where shelf temperatures were 34, 37 and 44 degrees, from Saturday morning until Sunday night was not sufficiently cooked with usual cooking time and temperature. Even when a longer time was allowed, the result was not perfect. Allowing the roast or steak to remain in room temperature to moderate the chill was concluded the most practical correction.

It was found that fruits and vegetables tended to shrivel and dry at too low a temperature. Another disadvantage of the low temperature was the difficulty in handling butter. These low temperatures were found excellent for storing other dairy products and for making ice cream.

CHILEAN APARTMENT HOUSE IS ELECTRICALLY REFRIGERATED

An 18-apartment building under construction in Santiago, Chile, will be equipped throughout with electric refrigeration. The building is in one of the most fashionable sections of the city. The owner of another building containing twenty-five apartments is considering equipping each apartment with electric refrigeration. Commercial units have been more rapidly accepted in Chile than domestic.

Frigidaire Man on Portland Home Modernization Bureau

P. S. Wiggins, Frigidaire Corp., Portland, Oreg., has been named one of the trustees of the new Home Modernization Bureau of Portland. This bureau is for the purpose of encouraging the converting of old homes into modern ones including electric refrigeration.

MACHINE DIRECTORY IN JAN. 2 ISSUE OF NEWS REPRINTED IN ENGLAND

Directory information regarding the small and intermediate refrigerating machines produced in the United States is contained in the Feb. 21 issue of *Cold Storage and Produce Review,* published in London, England. Forty-one photographs of condensing units and specifications, which were contained in the Jan. 2 issue of the NEWS are included.

This directory which is entitled, "Transatlantic Types of Automatic Refrigerators," is prefaced with the statement that, although the vast majority of the many interesting types of automatic refrigerators shown in this directory are not marketed in Great Britain, and are never likely to become so, yet *Cold Storage* feels that it is doing a service to the cause of refrigeration in England to show the progress made on the other side of the Atlantic.

"The directory of current types of small refrigerating units marketed in U. S. A. is reproduced by kind permission of the ELECTRIC REFRIGERATION NEWS, the fortnightly organ of that section of the industry which so enterprisingly and admirably reflects in the United States a great and growing force in the industrial world."

GAS REFRIGERATION IS AID IN ELIMINATING SEASONAL PEAKS IN ANNUAL GAS CONSUMPTION

Domestic gas refrigeration is an important factor in eliminating seasonal peaks of production in the gas industry, according to Oscar H. Fogg, vice-president of the Consolidated Gas Co. of New York City.

In a statement referring to the annual report of the company Mr. Fogg said the refrigeration division exceeded its 1928 estimates by installing more than 5,000 Electrolux refrigerators in apartments and individual dwellings, which added nearly one hundred million cubic feet to the annual send-out of gas.

Mr. Fogg pointed out that the largest consumption of gas has always been during the cold weather months when people remain in the city, and when industries are operating at capacity, and heating is necessary. While the amount of gas used by the individual refrigerator is small, the aggregate during the summer tends to make possible a more economical use of equipment, he said.

HERRICK REFRIGERATOR CO. SUFFERS LOSS BY FLOOD

Herrick Refrigerator Co., Waterloo, Iowa, suffered a loss reported at approximately $8,000 as a result of recent floods. Operation had to be suspended for several days and some material was lost.

New Seattle Florist Shop Is Copeland Equipped

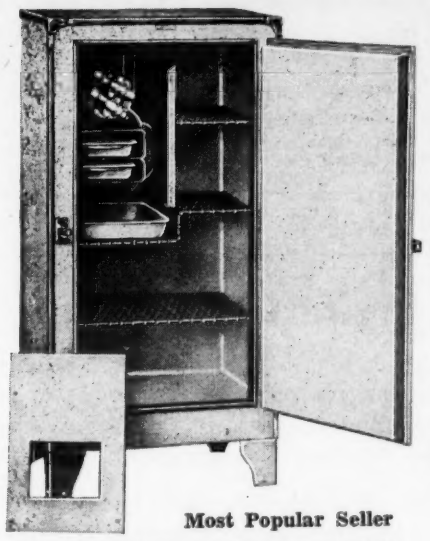
A Copeland refrigerated florist display case is being installed in the new store of Rasaia Bros., Seattle, Wash., florists, in the Orpheum Building. This is the third store to be opened by Rasaia Bros.

Will Sell Refrigerators, Cars and Radios in Bridgeport

Auburn Sales of Bridgeport, Inc., Bridgeport, Conn., has incorporated to deal in automobiles, electric refrigerators and radios. The incorporators are Charles G. Miller, 2291 Fairfield Ave., Bertha Miller, and Eric A. Stolpe.

You Can't Go Wrong

IF YOU USE Crystal ALL STEEL CABINETS ON YOUR APARTMENT HOUSE JOBS



Most Popular Seller

No. 521—5.2 Cu. Ft. 6½ Sq. Ft. Shelf Space. Removable Front Baffle. Porcelain Drip Pan. 22½" wide, 45" high, 17½" deep.

Can also be furnished without legs. Special Sizes to meet any requirement.

Ask for Details.

Crystal Cabinets have made a 100% record for service and satisfaction in thousands of old and new apartments the past three years. This is not surprising when it is considered that Crystal has been making steel refrigerators since 1910.

Pure Cork Insulation, sealed within air-tight steel walls is one of the many reasons for Crystal's remarkable record.

Crystal Cabinets will reduce the cost of the job because more than the usual number can be hooked up on one compressor.

CRYSTAL REFRIGERATOR CO.
FREMONT, NEBRASKA

M.&W.Co 1876 LACQUERS ENAMELS

A Lacquer Finish that Has Stood the Test

M & W REFRIGERATOR LACQUER ENAMELS

A Quality Reputation on these products has been established through actual large quantity production on Cabinets widely distributed throughout the world.
Another complete M & W Finish including either Lacquer or Oil Primer followed by M & W Lacquer Enamel in White or Colors.
We invite your correspondence regarding your particular problems.

MAAS & WALDSTEIN CO.
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It's Here!

A few good territories still open for responsible representatives qualified to install and service these machines.

The Juruick "Cub"
¼-Ton Capacity

Here's the machine you have been waiting for . . . Dependable, economical, simple in design, self-contained, automatic, shipped ready to set up. Easy for the user to operate . . . and easy for the dealer to sell.

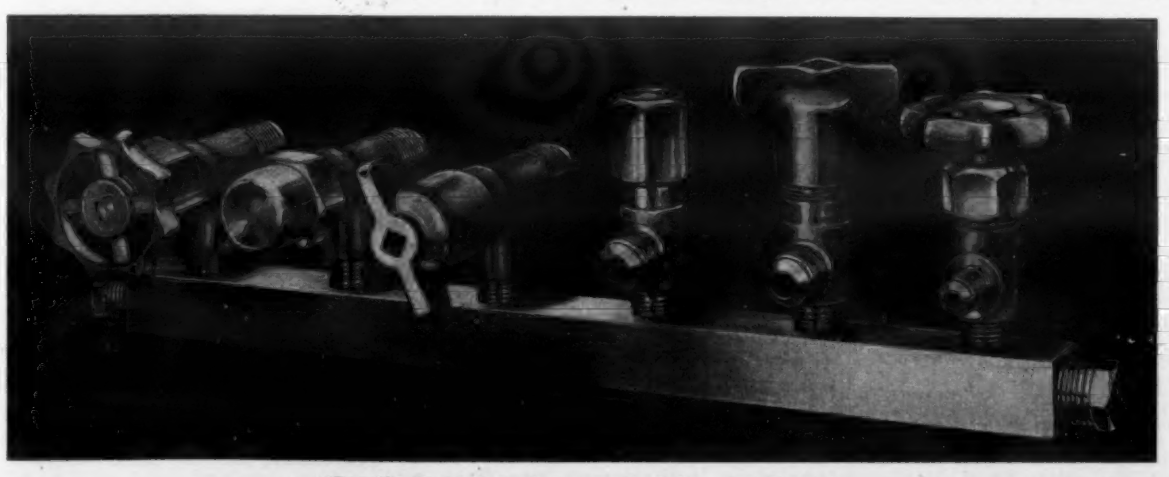
The complete Juruick line includes machines up to 30 tons capacity

AMERICAN ENGINEERING COMPANY
2420 Aramingo Ave., Philadelphia, Pa.

KEROTEST LEADS AGAIN!

Complete Manifolds—Manifold Valves—or Line Valves may now be obtained with wing nut seal caps containing hollow squares for operating stems—or equipped with neat forged brass handwheels. Anticipate the safety code requirements!

By the Pioneers of Forged Brass and Seal Cap Style Valves for the Electric Refrigeration Industry.
Developed 6 Months Previous and Thoroughly Tested and Improved Before Marketing



(Specify Style of Seal Cap Desired for your Valves).

KEROTEST MANUFACTURING CO. Pittsburgh, Pa.

ELECTRIC REFRIGERATION NEWS

The Business Newspaper of the Refrigeration Industry

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MARCH 27, 1929

Patent Ligitation

WHAT is undoubtedly the most important legal decision affecting the patent situation in the electric refrigeration industry was handed down last week by Federal Judge Tuttle in the infringement trial of Frigidaire Corporation vs. General Necessities Corporation.

The importance of the patent situation in the electric refrigeration industry is well known to all those who have been intimately connected with the development of the art, and has been recognized by Electric Refrigeration News through the publication of many columns of data on patents in this and in related fields.

In the fourth issue of this paper, November 20, 1926, the editorial column was devoted to the subject of patents. The following paragraphs made a prophecy which is now being fulfilled:

"American inventive genius is renowned the world over. The patent laws of the United States which are assumed to grant to the inventor the exclusive rights to his accomplishment for a period of seventeen years, are undoubtedly one of the contributing factors to the progress and prosperity of the country. They have lent encouragement to inventive minds and have frequently resulted in handsome rewards. Outstanding successes have created a general impression that to 'get a patent' is synonymous with riches.

"It is one thing to get a patent, however, and quite another to establish one's rights to the rewards thereof. A patent, as someone has expressed it, is 'a license to start a fight.' Court action is usually necessary to determine the merits of the original, as well as conflicting claims.

"A new and growing industry, with a product for which there is a wide-spread market and therefore offering possibilities for large financial profit, and especially one which involves a combination of mechanical, electrical and chemical features, some new and others well-known, may be expected to provide a battle-ground for patent litigation. Patent lawyers who are familiar with electric refrigeration say that the patent situation is particularly difficult and involved. A number of cases must be thoroughly threshed out in the courts, in all probability, before the validity of numerous broad claims, and a multitude of minor ones, will be definitely known."

In the case just decided the issue was boiled down to one patent which broadly covered the air-cooled machine. This patent No. 1337175 granted to Fred Wolf April 3, 1920, after changing hands several times was finally purchased by the parent of the present Frigidaire Corporation. Because of its broad coverage, it has long been a threat to various manufacturers of domestic units.

Likewise the Kramer patent No. 1280765, issued October 8, 1915, which deals with the assembly of the essential components of motor, compressor and condenser on a common base and the location of this assembly in a lower compartment of the refrigerator cabinet, has also appeared to be one of outstanding importance. This patent was included in the original complaint by the Frigidaire Corporation and carried part way through the trial but was dropped so far as this particular suit was concerned and remains unprejudiced by the decision just rendered.

There was a time when certain farseeing executives saw the possibilities of pooling the patent rights of a few leading companies. Among the arguments advanced in favor of such a move were: first, to eliminate the expense of litigation; second, to make immediately available to the companies concerned all advances in the art to the end that industry's progress would be speeded up and, third, to secure the position of the then leaders in the field and forestall the spread of manufacturing activity among an unlimited number of new concerns.

As to whether the interests of the industry and the public would be best served by such an arrangement and whether the art would advance more or less rapidly if controlled by a few strong hands, is a matter for speculation. Opinion, in some cases at least, would probably hinge on whether the individual would be brought inside or left outside the fold as a result of such a combination. Proposals of the kind seem to have failed, however, the executives having elected to take their chances alone. In some respects the present situation is comparable with that in the automobile industry at the time the famous Selden patent was a factor. Perhaps a parallel may be drawn in this industry.

Office Setting Features Buffet Kelvinator—A Man's Refrigerator

New Orleans Public Service, Inc., New Orleans, recently displayed this luxuriously fitted office, including a buffet Kelvinator, in one of its windows.

REQUESTS FOR INFORMATION

Readers who can assist in furnishing correct answers to inquiries or who can supply additional information are invited to address Electric Refrigeration News, referring to the query number.

Wants Distributorship

Query No. 211—A reader in Connecticut writes: "We have a specially trained distributing organization and have decided to take on an electric refrigerator. Can you refer us to any manufacturer who is looking for a connection of this type in this territory?"

1928 Production Figures

Query No. 212—A reader in Maryland asks: "I would greatly appreciate it if you can advise me where I may procure the following information, viz: How many household cabinets were produced and sold by the following manufacturers: General Electric Co., Frigidaire Corp., Kelvinator Corp. and Copeland Products, Inc.? I have somewhat a hazy recollection that it is possible to secure this information through the Department of Commerce at Washington, D C. If I am not correct will you not be good enough to advise me as to what source I should apply to for this data?"

Guaranteeing Temperatures in Commercial Refrigerators

Query No. 213—A reader in the East writes: "We have been installing electric refrigeration equipment in small markets and the question of guaranteeing temperatures constantly comes up. Has any standard form of guarantee been adopted or is there a fairly uniform specification included in the contract? The question of guaranteeing temperatures in a commercial refrigerator depends, of course, upon the room temperature to be considered and particularly when the temperature shall be taken and where We have in mind that on very hot days with a great deal of service on a box the temperature of the box, due to frequent opening and closing of the doors, may be several degrees higher than what it would be if the doors were kept closed. Therefore, we would like to know if any uniform standard for specifying the guarantee as to box temperatures has been arrived at so far as you may be aware Any information that you might give us along this line will be very much appreciated"

NOTE—See article on page 1, Feb. 27 issue of the NEWS regarding proposed temperature scale for commercial refrigerators. These temperatures have been submitted by the Joint Commercial Refrigeration Committee representing the Commercial Refrigerator Manufacturers Association and the Refrigerating Machinery Manufacturers' Association.—Editor.

Thermostat for Gas Refrigerator

Query No. 214—A reader asks, "I am wondering if you could put me in touch with any concerns manufacturing thermostats that could be used on a gas fired absorption machine."

Production Data

Query No. 215—A reader in Illinois writes, "In your issue of Feb. 27 I noticed a very interesting tabulation showing exports of electric refrigerators for the year 1928. I would be very much interested to have some figures on production of both domestic and commercial refrigerating units for the year 1928, as well as for several years prior thereto, if such data is available."

Cabinets for Apartment Installation

Query No. 216—A reader in Alabama asks, "Can you give me the name of a manufacturer who can furnish us with cabinets of the following specifications, porcelain interior and exterior, food storage capacity about 4½ cu. ft., cork insulation and base for individual units. These cabinets must be designed for apartment installation."

Salad Counters

Query No. 217—A reader in New York writes: "We would appreciate it very much if you could give us the names and addresses of concerns manufacturing salad counters for restaurants, suitable for installation with Frigidaire equipment."

NOTE—The following concerns manufacture salad counters: Acorn Opalite Metal Specialties Co., 1052 W. Monroe St., Chicago, Ill.; Aurora Metal Cabinet Works, Inc., Aurora, Ill.; Holcomb & Hoke Mfg. Co., 1545 Van Buren Ave., Indianapolis, Ind.; C. Schmidt Co., John & Livingston St., Cincinnati, Ohio. and the Sherer-Gillet Co., Marshall, Mich.—Editor.

Refrigerated Truck Bodies

Query No. 218—A reader in the East asks: "Would you please furnish me with manuals of manufacturers that make refrigerator bodies and equipment for automobile trucks, especially for conveying meats."

NOTE—The following concerns manufacture refrigerated truck bodies: Anheuser-Busch, Inc., 721 Pestalozzi St., St. Louis, Mo.; Brockway Motor Truck Corp., Cortland, N. Y.; Fitz Gibbon & Crisp, Inc., Trenton, N. J.; John J. Groethe Co., Inc., Woburn, Mass. and the William F. Baird Co., Winchester, Mass.

Mineral Wool

Query No. 219—A reader in Wisconsin inquires: "Can you furnish the names of manufacturers of insulating material used for packing, similar to Mineral Wool. Who manufactures Mineral Wool?"

NOTE—The U. S. Mineral Wool Co., 280 Madison Ave., New York, N. Y., manufactures Mineral Wool insulation.—Editor.

Magnetic Control Switches

Query No. 220—A reader in Pennsylvania writes: "Would it be possible for you to put us in touch with some concern that manufactures magnetic control switches similar to the Allen-Bradley switches."

Seeks Territory in Chicago

Query No. 221—"Please inform us of any manufacturer of electric refrigerators making a self-contained model who has territory open in Chicago, Ill. This model should have 4 cu. ft. of storage capacity and a height not over 48 in. Would be appreciated, if manufacturers who are interested in opening territory in Chicago would correspond with R. D. Hughes, Manufacturing Distributing Co., 2606 N. Hamlin St., Chicago, Ill."

Condensing and Cooling Units

Query No. 222—A reader in Indiana asks: "We have a refrigerator called Snow White which we want to make up-to-date. We have been advised that you could supply us with the names of firms making electrical units to install in old style refrigerators."

Wants Franchise in New York

Query No. 223—A reader in New York writes: "We are desirous of handling another make of electric refrigerator and wish to know whether or not territory in this state is still open. We have been agents for the ———— for the past two years, but due to excessive servicing we are about to discontinue its sale. While we are interested mainly in household units we also would like to handle commercial work."

Gas Refrigerator

Query No. 224—A reader in Texas asks: "Will you furnish us with a list of manufacturers of gas domestic refrigerators other than the Electrolux? We are in the market for an agency of gas refrigerators."

Ethyl Chloride

Query No. 225—A reader in Minnesota writes: "We are interested in securing the names and addresses of manufacturers of ethyl chloride."

Chromium Plating

Query No. 226—A reader in Oklahoma inquires: "Will you kindly advise me where I may get information concerning chromium plating for hardware? Is chromium plating a process that any plating company can use, or is it furnished by one company only?"

Chromium Plated Hardware

Query No. 227—A manufacturer of electric refrigerators writes: "Will you please advise us of available source of supply of fancy chromium plated hardware for use on refrigerators? We would like to get what information we can from some manufacturer who is turning this out as a stock item and not being made up for special orders. Hinges, locks and strikes must be ¾-in. offset and if there are any available sources of supply close to Detroit, we would appreciate it very much if you would ask them to send samples and prices of the same."

NOTICE

Owing to the amount of space required for the report of the patent trial, information on ice cream cabinets, soda fountains and store equipment previously announced as a feature of this issue, has been omitted, but will appear later.

REPLIES TO QUERIES PUBLISHED IN PREVIOUS ISSUES

Under this head will appear discussions of, and answers to, queries previously published. Readers are invited to supply additional information on these subjects.

Query No. 204—Harvey Lindsay, president of the Dry-Zero Corp., Chicago, Ill., writes, "In regard to Kapok for insulating ice cream cabinets, such a method of insulation was used by us some nine or ten years ago, in fact, U. S. Patent No. 1,462,648-claim No. 5, was granted to us on a heat insulating wall containing a vegetable fibre known as Kapok.

"The efficiency of the unit, when new, was quite fair, but it was soon found disastrous as far as any degree of permanence went. Investigation revealed two facts: 1. That it is impossible to pack loose fibre into a wall with the remotest degree of that perfect minute uniformity which is completely vital to good insulation. 2. That this being a naturally curly fibre it was not long before the Kapok so packed, twisted and curled up, or "balled up" as we called it.

"The inevitable result of this was in a year or so the balling up caused the opening up of air channels through the body of the material which, of course, proved fatal to the insulation value. It was only after three years of study and research that we discovered how to use this fibre for permanent insulation. This consists in relatively straightening the fine curly fibres and felting them parallel to each other, and so that they will lie across the intended line of heat flow. This graining as we called it, does two things, it eliminates any possibility of balling up and increases the insulating value of the same thickness and density as compared to the heterogeneous packing of fibre, even were it possible to make it uniform."

Query No. 207—Glenn Muffly, chief engineer, Copeland Products, Inc., Detroit, writes, "Replying to your letter of March 6, relative to the comparative efficiency of air and water cooled condensing units, it is our practice to use a motor 30% to 50% larger on an air cooled job than we use on a water cooled job, which employs the same compressor and is given the same capacity rating.

"This is because the cooling water used is normally considerably cooler than the cooling air used on air cooled machines. If you had very cold air and very hot water, the difference might even be in the opposite direction.

"As a rule, it is cheaper to buy the cooling water for a water cooled machine, than to buy the extra current required for an air cooled machine, but there are locations, particularly in the southwest part of the country, where the city water is very warm, and the water rate is very high, making it cheaper to operate an air cooled machine than to operate a water cooled machine.

"Our machines use methyl chloride instead of the refrigerant mentioned in your inquiry, but the general statement given above will hold true for both refrigerants. The prospective buyer should tell the manufacturer of the machine what the local rate is for water, average temperature of water, and what the price is for current, and get the manufacturer's recommendation as to which machine should be purchased."

Query No. 207—C. C. Spreen of the Kelvinator Corp., Detroit, writes, "Pertaining to the relative efficiencies of air and water cooled units, much depends on a large number of variable factors such as: average temperature difference between air and water; kind of water valve and setting; suction pressure of unit and comparative condenser performance of air and water cooled units.

"In general, however, water temperatures are 10 degrees to 15 degrees below average air temperature in the summer. Water valves usually admit water quantities to give discharge pressure in the neighborhood of pressure obtained with air at the same temperature as the water. Operating suction pressures are usually 6 inches to 10 inches vacuum. With the above comparison the water cooled unit will have approximately 10 to 15 per cent greater efficiency and approximately 5 per cent greater capacity for each 10 degrees of temperature difference between air and water, assuming the fan on the air cooled unit uses 10 per cent of the total power.

"Tables on this subject are not available to be applicable to any unit, under such indefinite conditions. Water cooling becomes desirable under any or all of the following conditions which are to be met. Relative costs of power and water are so that the water bills are less than power savings, and the net saving is large enough to warrant the additional installation costs. Large units when installed in locations where sufficient air circulation is not obtainable, or when room temperatures are very high. Large units installed when fan noise is objectionable."

Patent Suit of Frigidaire vs. General Necessities

COURT RECORD OF THE TRIAL

UNITED STATES OF AMERICA
IN THE DISTRICT COURT OF
THE EASTERN DISTRICT
OF MICHIGAN
NORTHERN DIVISION
In Equity No. 1611

Frigidaire Corporation, Plaintiff, vs. General Necessities Corporation, Defendant.

Testimony taken and proceedings had in the hearing of the above entitled cause before the Hon. Arthur J. Tuttle, District Judge, beginning on Monday, March 18, 1929, at Bay City, Michigan.

Appearances:
Messrs. Cooper, Kerr & Dunham,
By Drury W. Cooper, Esq., and Thomas J. Byrne, Esq., and
Harry E. Lindsay, Jr., Esq.
Appearing on behalf of the Plaintiff.
Messrs. Dean & Frye,
By George Rex Frye, Esq.
Appearing on behalf of the Defendant.
Monday, March 18, 1929
10:00 o'clock a. m.

Opening Statement on Behalf of Plaintiff

Mr. Cooper: If your Honor please, the suit was brought in the summer of 1926 by the then owner of these patents, which was the Delco Light Company. That was the original plaintiff. It was a subsidiary of General Motors; and in the bill as originally filed, there were, I believe six or seven patents included, and also a charge of unfair competition. An answer was put in, and I believe some amendments to the answer—there were one or two changes of counsel on the defendant's part—and ultimately the pleadings became much simplified by the filing of a supplemental and amended bill by the Frigidaire Corporation, which is now the plaintiff, and which was simply another subsidiary of General Motors, to which this department of the General Motors business had been transferred and in which all its activities in this realm were concentrated.

That supplemental and amended bill limited the charge to three patents, and eliminated the charge of unfair competition; and in preparation for the trial, it seemed to me that it would be sufficient for us to stand upon two patents, so that when the thing has all been strained out, there are two patents yet remaining, known as the Wolf Patent 1337175, issued on April 13, 1920, and the Kramer Patent, 1280765, issued on October 8, 1918.

Disclaimer on Wolf patent filed by Frigidaire limits two of the claims.

I will hand up to your Honor copies of those two patents, and will mention at this time what I will explain a little further along in my preliminary statement, that a disclaimer has been filed with respect—or rather, the effect of which is to limit two of the claims of the Wolf Patent. Now, in the Wolf patent, we limit our charge of infringement to claims 10, 15, 16 and 18, and on the Kramer Patent—

The Court: No disclaimer in the Kramer patent?

Mr. Cooper: No disclaimer in the Kramer patent.

The Court: Does your disclaimer in the Wolf patent affect those claims 10, 15, 16 and 18?

Mr. Cooper: Only claims 10 and 15. The charge in the Kramer patent is based upon claims—, well, all the claims but the first two; that is, the charge is based on claims 3, 4, 5, 6, 7, and 8.

The Court: In which patent is this?

Mr. Cooper: The Wolf patent—oh, this last statement?

The Court: The Wolf patent has to do with 10, 15, 16 and 18?

Mr. Cooper: Yes.

The Court: And the Kramer?

Mr. Cooper: With 3, 4, 5, 6, 7 and 8.

I won't go into the patents at the moment, if your Honor please, because I think perhaps I can eliminate a good deal of general consideration of the matter, so far as the opening statement is concerned, by trying to explain to your Honor what I understand artificial refrigeration to be.

Counsel for plaintiff outlines general development of refrigeration.

I might say, in a preliminary way, that the art of artificial refrigeration is very old. I think its use commercially, in large units for ice making, goes back to at least 50 years; and speaking generally, ammonia was the agent that was used in those large plants. There, their preliminary object was different from the devices with which we are concerned here, in two respects:

In the first place, they were for the most part for making ice, which should be peddled around just as though it had been cut from a lake and stored in an ice house, and while some were used for cooling rooms, nevertheless, the units were so large and the machinery of such a character as to require a nurse or experienced attendant in the nature of an engineer, always in charge.

I think there will be no dispute of the fact that other agents than ammonia were at least proposed, and very likely to some extent used in those large units, and of the agents that come into consideration or will come probably into discussion here other than ammonia, sulphur dioxide and methyl chloride are the usual things, and they were to some extent used, at any rate were proposed, in those old ice making plants.

Now, there will be no dispute, I think, on my general statement that a desire had long existed for a household unit to take the place of the refrigerator and the ice man, and a great deal of money expended by many manufacturers in this country in an effort to get up that sort of a thing; but there were difficulties in the way that came to arise as complete obstacles to that development over a very considerable period of years. The requirements are rigid, because the units are small. A householder who uses 50 to 100 pounds of ice a day has a comparatively large establishment, and when you get down to creating that effect in an ice box by a little machine, there seemed to have been very serious obstacles in the way of its creation, because, when I say it, it will be at least understood, and I think there will be no dispute about it—that this sort of an implement in a household has to be like a vacuum cleaner or a sewing machine, what has come in common parlance to be said as "fool proof." It has to run indefinitely when it is required, it has to be self-regulating, because you don't want it running all the time. I think experience is generally that if the mechanisms and machine parts are running for, say, eight hours out of twenty-four, on and off, that is about all that is required, and of course, the householder wants to save on power—which means electricity in this instance—as much as possible, and the householder has to have something that requires no more attention than a sewing machine; an occasional adjustment, or an occasional oiling, or something of that sort.

Of course, it has to be relatively simple in construction, even in these days, when, what with automobiles and wireless and what-not, the average person is getting to be more of a mechanic than the expert was in his grandfather's day.

Now, I should like to state by reference to a simple diagram the general principle of an artificial refrigeration system. There has to be a mechanism known as a compressor, which ultimately is a piston working in a cylinder so as to compress a gas, and assuming the gas is flowing up in this right-hand pipe into the compressor (referring to diagram), it is compressed there until it is in the form of a liquid. That heats the gas—any compression of gas adds heat to it—so that as this liquid comes out of the compressor into this pipe in the form of a warm liquid.

Now the next thing to do is to extract the heat of compression from that liquid, that is, to reduce it by a similar means while it is still a liquid until it is down to about atmospheric temperature. It may have come out of the compressor at 150 or 200 degrees, and it has to be reduced in the condensing coil while still in liquid form to atmospheric pressure, and that may be done by sprinkling water over the coils or otherwise so as to take out the heat of compression.

Then, still being under pressure, the pressure working in this closed coil to force the refrigerating medium around and around, first in the form of a gas, and then in the form of a liquid, this compressor forces the liquid,which is gradually being cooled down to atmospheric pressure, and the liquid flows down until it reaches an expansion valve which allows it to come out of the large end of the valve in gaseous form, and there is a principle of physics which I understand will not enter in here, that when a liquid expands in the form of a gas, and it lowers in temperature and passes in liquid form to this expansion valve, and comes out on the open side at a very low temperature, and then it passes into these coils, the refrigerating coil, and that being in the ice box, the low temperature is thereby obtained. That I say, was a principle that was known and practiced for 50 years or more.

Now, the Delco Light Company, subagents of the General Motors, favored its commercial development, and about 1917, 1920 or 1921, after quite extensive research, it got its first development on the market.

That was a domestic refrigerator, a house refrigerator, and in that time, the apparatus, of which more will be said as the case goes along, the heat of compression was extracted by applying a stream of water over the condensing coil. That went into quite extensive use, and is still being sold by the General Motors, but it has certain undesirable features, the first of which is that there is a continuous flow of water being wasted, while the machine is in operation, which is an added expense of operation, and which requires a plumber for the installation of the pipe, and as one would naturally expect, the place where the housewife wants her refrigerator located is often the hardest place for the plumber to get at. So, one of the things that must be taken into consideration is the necessity for accessibility of the parts, and the Delco Light Company, following its long experience in that line, provided as a unit in a bottom compartment of the ice box, the compressor, and the motor and the condensing coil of the water coil unit, mounted them on a proper support and made it a removable part, removable as a unit by pulling out that support, it being connected by removable fittings in the refrigerating part inside, so you could pull the whole thing out.

They were charged with infringement by the then owner of the Kramer patent, which is the second of the two patents in suit, and after considerable negotiation it bought that patent.

Now at about the same time they were developing water cooling pipe, the water coil being in the bottom.

While they were developing this water cooled apparatus they also attempted to design an air cooled apparatus where the plumber would not be required at all, and where no water circulation would have to be applied to the coil, the condensing coil. They got along to a point, at least of encouragement, but the water-cooled was further ahead, and was being put out by a competitor of theirs known as Isko, who came on the market with an air-cooled apparatus, and that offered such superior advantage that the Delco Light people, after some lapse of time and watching its opportunity, bought the assets of Isko, which was not a very successful commercial venture, and among these assets, and as the principal one, as we shall endeavor to show, they bought the Wolf patent, in suit. This purchase was about 1922, and then there was renewed activity toward the development, with the result that about 1924 or the end of 1923 the air-cooled unit was put on the market by Delco Light, and from that time on they advertised both, with the same amount of advertising, they made no difference in the advertising as between one and the other, or in its sales effort, and there was, I believe, no substantial difference in price, but the difference in market receptivity was a very marked thing, so that the air-cooled, starting about the beginning of 1924, passed the water-cooled within two or three months, and continued on its upward way while the water cooled did not have much increase in its output with the result that at the present time the water-cooled is selling in number or quantity of about 38,000 units per year, and air-cooled 225,000 units per year.

That, if your Honor please, is in a gen-

(Continued Column 5, This Page)

OPINION OF THE COURT

Decision of Judge Tuttle Given at Close Of Trial, Saturday, March 23, 1929

UNITED STATES OF AMERICA
IN THE DISTRICT COURT FOR THE EASTERN
DISTRICT OF MICHIGAN, NORTHERN DIVISION
In Equity No. 1611
Frigidaire Corporation, Plaintiff, vs. General Necessities Corporation, Defendant.

Saturday, March 23, 1929

The Court: In accordance with my uniform practice, running through the last sixteen years, I will dispose of this case at this time, reserving the right to mark up the reporters' notes all I desire and change any of it that I think I made a mistake about, if I find time to do it. If I do not find time and do not do it, you use it the way it is, if you want to.

While there were originally seven or eight patents involved in this suit, they are now reduced to the one patent to Wolf, April 13, 1920, number 1337175. The application for this patent was filed December 23, 1913.

At this late hour, when everyone is anxious to get away, it will serve no purpose for me to attempt to describe the general principles here involved. They are very well known, and have been very well stated already in this record on both sides, and better stated than this court would be able to state them. They are well known, and very old.

The fundamental, big principle that is conceded by plaintiff, as well as claimed by defendant—by that I mean the circulating

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system, consisting of the refrigerating coil, condensing coil, compressor, expansion valve to keep the pressure high on the condensing coil and low on the refrigerating coil, and in their right relations, and a motive power to drive the compressor; that general and fundamental principle, using as a refrigerant something that will change from liquid to gas and from gas back to liquid at low temperature compared to water.

Those things were in use for very many years in the making of ice, and in cooling rooms and large refrigerator boxes in hotels, and we have the one used by Palmer in the refrigerator car. We not only have the Palmer patent, but we have the actual use, I take it, in fairness to the Palmer patent: While he had other patents and while he modifies his structure, I think it is fair to gather from Palmer's testimony that his patent was a practicable, workable patent; and we have that use.

Then, after this use for big machinery, and for big purposes, prior to the patent in suit, came the desire to produce something that was smaller, that could be used in the home.

That came ahead of the patent in suit, that desire, and that desire found expression in some actual structures of different kinds.

Now, one who carries from one art over into another art, gets credit for doing that, and in very many instances, gets patents for doing it. Using the same principles, or using them in another art, discloses enough of skill and genius so that it is rewarded by a patent, and some arts are so big and so complicated that I think one who would take something from one corner of it and carry it away across into another corner, might, in many instances, do enough of good, use enough of genius, so that he would get a patent for doing that.

The lines are not very fixed and marked which define an art, and I take it, it was something of a step to go from this manufacturing of ice and cooling of big rooms in packing houses, meat markets and hotels, down into the ordinary kitchen of the family and have an ice box; but that step, that bridge, was not built by the plaintiff—or by the patentee Wolf. The plaintiff cannot get that benefit of having built the bridge across, whether it be a bridge between arts—I do not think you can call it different arts, I think it is the same art. I do not think it is a wide chasm like we often find between arts, but I think it was a distant part of the same art, and it was quite a trip to take, and the one who originally took it should get some credit for it, not for a patent; but that bridge was not built by Wolf, he was not the first to lug things from the big, general field of refrigeration by this general principle we have been talking about. That was started by others. We find it in the patents, and we find it in the actual constructions that were put on the market, the things that were built. Other people thought of doing that thing, showed the way.

I take it that after someone has built a bridge across and carried some of the things across, that then, those that go back and pick up the things that are left and take them across, do not get very much credit for it.

I will pause right there to say that while defendant's structure is not at all a Chinese copy of the patent in suit, or anything of that kind, that any attempt to annul plaintiff's patent until it had missed the defendant's structure would make Plaintiff's patent worthless and it would be an idle undertaking. I think that by any fair interpretation of the Wolf patent the defendant infringes it.

I hold with the plaintiff on the question of double patenting

(Continued on Page 12)

(Continued from Column 2)

eral way the background of these two patents, and the circumstances that surrounded their acquisition and have surrounded the developments due to them.

Some time in 1926 the General Necessities Corporation, the defendant here, came on the market with its machine. I should have said that the Kramer on the modern unit has been used from the beginning by the plaintiff in its air cooled machines as well as in the water cooled machines it had made before it acquired the Kramer patent, and under which it was notified for infringing on the water cooled machines.

Well, the General Necessities came out with this device in 1926, and this suit followed, and now comes to your Honor for trial on these two patents.

Wolf patent emphasizes disadvantage of water cooling.

Now, if I may I should like to take up the Wolf Patent, which was first to be applied for, and natural to take up as being the first of the two inventions.

It states, quite succinctly, I think, at line 18 of the first page of the specifications, it says:

"The invention is primarily intended to be used for domestic purposes and one of the objects is to obviate the various defects and disadvantages to be found in prior systems as used for refrigeration on a large scale or for the manufacture of ice in commercial quantities. One of the disadvantages of prior compression systems is in the cooling of the refrigerant. Where water running is used to cool the condenser there is not only the expense involved in the installation and upkeep, but the apparatus, including the plumbing is very cumbersome and considerable difficulty is experienced in properly controlling the speed and proper disposal of the water, particularly if the pressure varies in the supply main as is nearly always the case."

I may pause there to dwell on that. If the refrigerating operation requires a definite rate of flow, as it must, the water for the cooling of the condenser coils and the pressure in the city mains suddenly drops, as we often find it does, then the rate of flow of water is much too low and too slow to cool the condensing coils properly, so the machine is impaired in its operation.

The Court: In all the farm houses the pressure is continually decreasing. They first start the gas engine in the morning, and after they use it all day it gradually keeps running down—

Mr. Cooper: I was taking the most favorable condition in the city. Even there, the water pressure varies, just as the patentee says.

Explains what is meant by a refrigerant of "low boiling point."

Now, he says, "The present invention overcomes this various disadvantage, and it consists generally, in the use of a refrigerant of low boiling point such as sulfurous acid (SO2), compressing such refrigerant and delivering it to a receiver, then cooling the refrigerant to something above the temperature of the air surrounding the receiver, and finally expanding the refrigerant to produce a refrigerating effect."

Now, I should like to dwell for a moment on what the experts will tell your Honor about more in detail and with much greater accuracy, on what he means when he says at line 38, "It consists generally, in the use of a refrigerant of low boiling point."

We are all quite familiar with the fact that water, for example, boils at 212 degrees at sea level, and we know, either by experience or hearsay, that if one boils water on the top of a mountain such as Pike's Peak, it boils at so much lower than 212 degrees, that he cannot cook an egg except by a very long application of the water.

Now, I might say at this point that what the defendant uses is known as methyl chloride as distinguished from sulphur dioxide, which the patent mentions, but I want to explain about the boiling points of both of them. The boiling point means the point at which this gas that has been compressed to liquid form starts to go off as a gas again.

The Court: Well, by low boiling point, you refer to the mountain top, boiling at much lower temperature. Of course, when we get alcohol in the radiator, it boils at a much lower point than it does when it is just water, too—alcohol?

Mr. Cooper: Oh, yes.

The Court: Isn't that what you mean there, the liquid of lower boiling point than—

Mr. Cooper: Than ammonia. That is what he is dealing with there. I have here a little graph or chart.

The Court: Sulfurous acid boils at a lower point than ammonia does.

Mr. Cooper: Yes. And I can show that on this little chart, if your Honor will look here for a moment. That shows the curve of the boiling points of ammonia at various pressures.

The Court: Air pressures?

Mr. Cooper: No, at all sorts of pressures. Now, for example, there is the air temperature. We will assume that your ammonia has been compressed in here and is in liquid form in these coils, and at the outside atmosphere, or the temperature of the water is of the order of 80 degrees, so that if this liquid ammonia is at, we will say, 200, just to say something, then we can only cool it down, let us say, to 80 degrees, and we have to find out what pressure must be maintained on the ammonia so it will boil off at 80 degrees; so we take the ammonia curve, and we take a temperature of 80 degrees and run it up to there, and we find that we have to have something of the order of 155 pounds pressure to make it perform its job.

The Court: More than water?

Mr. Cooper: It might be. But if we take methyl chloride and find out the corresponding pressure at which it will boil off, at 80 degrees we find that is only 80 pounds pressure.

Now, the difference between maintaining 160 or thereabouts pounds pressure and 80 pounds pressure for the same temperature represents, as I undertand it, what this patentee means when he says that SO2 has a low boiling point; and just as a matter of curiosity, you will see that sulphur dioxide, while having a little the advantage of methyl chloride on this pressure range, is much closer to it than ammonia is, and it is really closer than any of the

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Opening Statement by Counsel for the Plaintiff (Continued)

(Continued from Page 11)

other substances that happen to be shown on this chart.

That is only by way of stating what Wolf means when he speaks of a refrigerant of low boiling point. What it implies is, as I understand, that he gets his cycles with much less expenditure of pounds than if he had ammonia there, and there are other diadvantages which the experts will testify about, such as the danger from an ammonia leak as compared with the danger from a sulphur dioxide or methyl chloride leak.

Now, he goes on at line 45 to say: "By using sulfurous acid as suggested above and providing a large superficial area in the condensing coil,"—that is, so that it may be readily cooled or rapidly cooled—"the refrigerant may be condensed and liquified by exposing the coils to the air only.' Now, he is getting away from its water, and the use of cooling water is dispensed with. He goes on to say: "The invention is further embodied in an apparatus for carrying out the process, and an illustrative form of such apparatus in shown in the drawings," and so on.

Now, he proceeds to describe the structure that is shown on the sheet of drawings. He says the ice box is marked "10"; that is the outside enclosure, which may be of any desired construction having a shelf "11" at the top. That is a little erection here, which is a mounting for other parts he is about to describe.

13 indicates a compressor mounted on the top wall 11-A of the refrigerator, near one end thereof. That is shown in the lower figure, where you are looking down on top of it, and it is also shown in the upper figure here. That is the compressor comparable with that on the simple sketch that I showed your Honor.

And 14, he says, is a motor. There is the fly-wheel of the motor there, shown—well, it is not shown so well in the lower figure. He says "14 is a motor for driving said compressor mounted on said top wall near the other end thereof."

15 indicates a pulley, a driven pulley, adapted for the operation of the compressor. 15 is your driven pulley. Your motor is there—I have got that wrong. This is the driven pulley here, and he says, "The driven pulley 15 is made heavy so as to act also as a fly wheel, and preferably has spokes 17 constructed,"—he indicates the spokes in there, at 17, which, he says, are "constructed to form fan-like, spiral blades which act to produce a draft over the top of the refrigerator and effect a continual change of the air in and about the apparatus thereon."

That is, by this he is driving air against these condensing coils, and consequently effecting their cooling.

The Court: Like an automobile fan?

Mr. Cooper: Exactly, sir.

(Continues reading.) "The compressor and the motor, as shown, are mounted on a common, hollow base 18 which is attached by suitable bolts 19 to the top wall 11a of the refrigerator.

"A condensing coil adapted for air cooling as indicated at 20."

See, he has that in the form of a cage, about the motor and the condenser.

(Continues reading.) "It comprises a considerable length of tubing, having a comparatively small cross section, and a comparatively thin wall to obtain maximum cooling. I have found that the best results are obtained by using copper tubing of about 3-8 inch diameter. As shown the condensing coil is mounted above the refrigerator and it is exposed to the air throughout its length between the compressor 13 and the expansion coil 12."

The Court: Do I understand that is right in the open?

Mr. Cooper: Yes, as he shows it, it is right in the open there.

The Court: On top of the refrigerator?

Mr. Cooper: On top of the refrigerator, and the coils themselves are kind of a protecting cage about the fly wheel and the fan.

Importance of 3/8 inch copper tubing used in condenser emphasized by counsel for plaintiff.

Now, a matter of considerable importance here is this copper tubing of about 3-8 of an inch diameter, because that is what the plaintiff has used from the beginning and that is what the defendant is using; and while it might well have been, and I think it would have been, a proper argument from counsel, and a proper finding from your Honor, that claims 10 and 15 should be construed to cover that sort of a condenser, of the coil of copper tubing of about 3-8 of an inch diameter, nevertheless, out of abundance of caution, we have filed this disclaimer which limits claim 10 to just that copper tubing, 3-8 inch diameter; and claim 15—

The Court: You mean, you have limited it so if it should be a little thicker or a little thinner, it does not cover it?

Mr. Cooper: Well, we say substantially that. Let me read claim 10, and then the point will be clear. I will read it as it was originally.

(Reading.) "A refrigerating apparatus comprising in combination, means to compress a refrigerating gas to a pressure, the corresponding boiling point of which is above the temperature of the atmosphere,"—that is, that is true of sulphur dioxide and of methyl chloride; their boiling point is above that of the atmosphere—"an atmospherically cooled condenser for condensing the compressed gas,"—now, our brethren on the other side were arguing that that might be any kind of a condenser within that term of the claim, and we put in the disclaimer which your Honor will find on the last page of the patent, disclaiming from the scope of claim 10 all refrigerator apparatus which does not have atmospherically cooled condenser for condensing compressed gas composed of a considerable length of tubing made of copper made of about 3-8 inch diameter and having a comparatively thin wall.

The Court: Limited it to the using of copper?

Mr. Cooper: Using of copper of just about that diameter, and of a comparatively thin wall, just as he has described in his specification.

Now, the advantage of copper will be stated to your Honor. It is non-corrosive with refrigerating media, such as sulphur dioxide, and there are other advantages which will be stated, and the main one I can state to your Honor, which is that in the manufacture of these things, of course, you want as small a space as possible for your machine, and as big a

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OPINION OF THE COURT

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there; I will not go into that, but I don't think we have double patenting here. And I hold with Plaintiff, and on the right to disclaim I think under the case, plaintiff clearly had a right to disclaim as plaintiff has disclaimed in the Wolf patent.

Perhaps right there I might, if I say anything about it I surely wish to be understood as saying modestly and respectfully, I very gladly recognize my position as riding in the trailer and somebody else doing the driving so far as that particular question is concerned, but even one riding in the trailer might follow the truck ahead, and properly and modestly and respectfully point what seemed to be some danger in the road, and it does seem to me as to that that this case points out very clearly two dangers.

I had originally thought that one could by disclaimer save only the things which were contemplated by the broader claims and the claim which was too broad, but having a claim secured more than they were entitled to but intending to get, and the patent office intending to give him the thing, finally kept along with the other things which should not have been given, that the patentee could let go of those things which he asked and received in property, and still keep the remnant which he really

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asked for, and which was intended to be given to him, and under that interpretation and on that theory the two dangers that it seems to me this case points out, would not be present, and those two things which it seems to me are present, and I respectfully put on the record, are these:

The patentee Wolf at no time asked for a patent on the invention of 3/8 inch copper tubing; he never asked for it or urged it, and the patent office never thought of giving a patent on it. There is nothing in the file wrapper to indicate that, and that question was never considered as to whether or not it was new or novel as well as the other things, whether it was useful or not. The novelty of the thing never was brought to the attention of the patent office, they did not pass on it in any way, were not asked to, and did not do it, and then taking the ground of the very broad claim, then all of it, so far as the tubing is concerned is let go except the material, copper, and the size, 3/8 or thereabouts.

It is true it has pointed out in the specifications that Wolf preferred to use that, but that is a common thing, like telling how to build a wooden wheel. I might say I prefer to use myself a certain kind of timber in it, but that language used in the specifications in the description of the patent is very far from being claimed that it is used here in such a way as to not claim or suggest novelty about it in that regard, or to claim that it had not been done in previous times. There is no claim along that line, and no action taken about it, and then by the disclaimer without any action by the patent office at all, and under the statute, and that is the way that has to be done, let go everything except that the result is there comes to this Court these patents with the presumption of validity upon that thing which was never suggested to the patent office as being novel and they never passed upon the question of novelty at all, never questioned it, it was never brought to their attention as to whether that was new or old, or they did not look into it, and yet comes to this Court with the presumption of validity, and the presumption that Wolf was the first to do that thing, and it comes to this Court more than 15 years after the application for the patent, and nine years after the patent was granted. The question of priority and novelty would also have been easier to determine at that time. Now it is pretty difficult to determine at such a late date the question of novelty in a thing that has to do with the kind of wood used or the kind of metal used and the size used.

I mention two things, perhaps it ought to be called all one, and this second one only another reason for the misfortune of the first. That statute is something for which the Congress is responsible, but it seems to me that the dangers are such that it is well for the Courts to construe the statute in a limited way rather than to go by a very broad interpretation.

I have very gladly and readily followed what I believe to be the holding in this Circuit which puts approval upon this disclaimer, and I treat this patent just as if it had been originally allowed with the disclaimer. I give to it the presumption of validity, and that is the only question in my mind involved in this suit, is the validity of this patent. I think all of the things urged about its sale except the question of validity, depending on the claims in their present form, and the prior patents in suit of the art.

I think the question of infringement goes to the Plaintiff, as I have already stated that any fair interpretation of this patent will read upon the defendant's structure, and that the holding would be and must be that the defendant infringes, so I am brought right squarely to the proposition of the validity of this patent.

And I think it is anticipated by the five patents that defendant pleads in the answer and offers in the proof. Some of them are more valuable in one way than another from the standpoint of reading right on to the prior patents, probably, which claims in suit read on Leslie, 463036, more readily and easily than on any of the others, but I don't think that that is the only thing to be considered; I have in mind what Mr. Cooper says that it is not a word reading, but in truth and in fact it does read on, but the Leslie patent is in this art, and the bridge having been crossed, as I said before, I don't think you can

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space as possible for its effect, for the household goods, so that this condensing coil, which is of very substantial length has to be turned back and forth upon itself with as narrow turns as can be made without impairing the interior diameter. There cannot be any pinching down there, or you won't get your effect; and copper is a thing that lends itself very excellently to that; so that there is something more than words in making the disclaimer to make the claim fit the disclosure, because that is what we will have disclosed very specifically.

And there is a similar limitation in claim 15, excepting not quite so narrow.

Claim 15: "A refrigerating apparatus including in combination, a compressor, an air cooled condenser, and an expansion chamber, said parts being connected to form a closed circuit for the refrigerating agent, and a fan mounted to effect a circulation of air around the condenser and against the compressor."

The fan is an added element over claim 10, and the disclaimer says as to claim 15 "The patentee does disclaim from the scope of said claim 15 all refrigerating apparatus which does not have an air cooled condenser composed of a considerable length of metal tubing of not more than one-half of an inch diameter and having a comparatively thin wall." That is, that is not specifically limited to copper nor is it specifically limited to 3-8 of an inch, but it says not more than 1-2 inch.

Claims 16 and 18 require no disclaimer. They are of somewhat different terms. Claim 16:

"A refrigerating apparatus including in combination, a compressor, an air cooled condenser, and an expansion chamber,"—that is the pipe into which the gas goes after it has passed the expansion valve.

The Court: That is the cooling medium?

Mr. Cooper: Now you get down to the cooling coil, as they call it.

The Court: Well, that chamber is something before it reaches the cooling coil?

Mr. Cooper: No, the cooling coils really comprise that chamber. See, here is the expansion valve at 26 inside the refrigerator, and the cooling coils that do the work inside the refrigerator are marked 12 in the drawings, and they effect the expansion chamber, or constitute it.

(Continues reading.) "Said parts being connected to form a closed circuit for the refrigerating agent, a motor having a shaft connected to the compressor to drive the same,"—you see, the motor and the compressor.

The Court: This is the motor?

Mr. Cooper: Yes. Well, that drives this fly-wheel, and that fly-wheel is on the same shaft as the compressor, and it is virtually a part of the motor. (Continues reading.) "And a fan mounted to effect a circulation of air around the condenser also driven by said motor."

And claim 18 is similar to 16 in most parts. I will simply read it. (Reading):

"A refrigerating apparatus including in combination, a compressor, atmospherically cooled condenser means, an expansion chamber, a motor to drive said compressor, and a fan mounted to rotate about an axis parallel to the motor and driven thereby to effect a circulation of air around the said means."

That is the statement of all the claims on that patent.

Kramer patent embodies idea of a unit assembly mounted underneath the cooling compartment of the refrigerator.

I will dwell only briefly on the other patent, to Kramer, because that goes rather to mechanical features than to anything that is concerned with refrigeration, or the closed cycle of refrigeration as such. I think we need but glance at the claimant's drawings. He has his ice box above, a lower compartment there, and in that compartment he puts his motor and his compressor and his condensing coil, and they are all mounted as a single structure or unit upon this base, and the lower part is of course open. Now the desire is to have connections up.—

The Court: You mean it is open to what?

Mr. Cooper: It is no part of the ice box. It might have panels in front of it, but the point is, that as shown between figure 6 and figure 7, you can pull all the mechanism out.

The Court: As a unit?

Mr. Cooper: As a unit; and all you have to do is to unscrew two couplings, 27 and 28, that lead up to the expansion or cooling chamber, and then the mechanism can be taken out for inspection, oiling, adjustment and other things.

I will simply point out that on page 3 of the specifications, lines running from 85 to 111, that structure is described by Kramer, and his claims from 3 to 8 read upon it in various forms of language.

The Court: Did he claim to form the unit in some particular way, or is his patent simply on the thought of making all these different elements of the refrigerator into a unit? Just on the thought of making a unit, being able to put it in and take it out, or is there something about the way he grouped those various things together?

Mr. Cooper: No, I think it is generally on the idea as embodied by him of having them all in a single place, upon a withdrawable base. I will read one or two of them.

The Court: They are getting that kind of patent in almost every art now, and I was wondering whether the time is going to come when they can get a patent for doing that. In pretty near every art, somebody comes along and invents this thing and that thing, then they say, "Well, we will put them all together and have a unit there."

Counsel explains why General Motors bought the Wolf patent.

Mr. Cooper: Yes. Well, you are going back pretty well into this household refrigerating thing. You can see, at least, that it was not obvious, because Wolf did not have it. That is the first proposition; and the second thing, so far as this plaintiff is concerned, is this: It was faced with a suit on that patent, and it did its best to find an anticipation. It did not find an anticipation. It found a grant. It knew, as we all know, that there is a certain weight to the presumption of in favor of validity. It also knew that patent owners, like death, love a shining mark, and that the General Motors is a very shining mark for patent litigation; and it concluded, I suppose, that discretion is the better part of valor, and it bought the patent.

Now, whether it is valid or invalid, under all the surrounding circumstances of the case, is a thing that counsel on our side will argue most strenuously to your Honor, and I have no doubt that the defendant will be much more eloquent against the proposition; but it is at least a simple, clean-cut proposition, and as a matter of fact, it will be shown that it is a thing that has had and still has a real place in this art; it is applicable both to the plaintiff's water cooled and to its air cooled refrigerators, and under all the circumstances as they will be brough out and as I shall not argue now, we will submit that the patents should be sustained, and that since the defendant has it, I think

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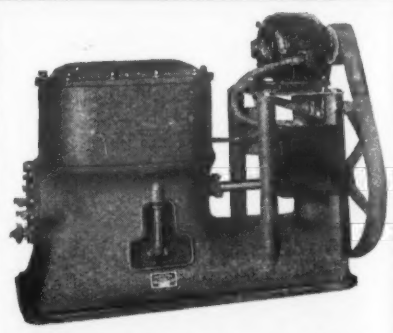

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PEERLESS units give you a COMPLETE line, ranging from one to ten tons.
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PEERLESS ICE MACHINE CO.
515 W. 35th Street
CHICAGO, ILLINOIS

Opening Statement of Defense

(Continued from Page 12, Column 5)

beyond serious cavil we will say that we have made a case and should have a decree.

I will not, at the moment, go into the defendant's structure, but I think there will not be serious dispute that if the claims we rely on are valid, they are infringed. However, I do not want to anticipate what my brother will say, nor does it seem to me to be necessary at the moment to carry out the particulars of infringement. I was rather endeavoring to inform your Honor's mind in a more or less non-letidious way of what we are having to meet in the case. The particulars of infringement which may or may not be disputed will be things to be brought out in our evidence. The facts will be perfectly clear, I think, and to our mind there will be no serious question of infringement.

Opening Statement on Behalf of Defendant.

Mr. Frye: Your Honor, at this stage, particularly inasmuch as counsel for the plaintiff has not gone into the detailed defense or construction of any kind, we believe that we would prefer to reserve the details of the defense. We would like to inform you generally that we believe that this is not a suit directed against the defendant primarily; it is a suit to endeavor to hold up, in a literal sense of hold-up, the refrigeration industry.

The plaintiff got into the refrigeration business many years after refrigeration machines were on the market. They made developments, no doubt, but there must have been 50 to 100 years' developments preceding even the formation of the first defendant company. There was made machines of varying sizes, big machines, small machines, household machines, small grocery machines, all kinds of machines. They made them with water cooled condensers, they made them with air cooled condensers. It will be clearly and convincingly proven that they made them not only with such refrigerants as ammonia, but specifically with sulphur dioxide and other low boiling refrigerants.

We also believe that it will be clearly proven that the formation of the condensing and compressing mediums, so that they are mounted on a single base, was old and well known before anyone in this particular suit was even born.

Now, we can go even further and say that the patent in suit, the Kramer patent, seems to attempt to tie up the placing of old and well known elements in a little different location than they had heretofore been placed. We do not believe that that is the subject matter of invention, or attains to a sufficient dignity to warrant it being called invention.

Now, the Kramer patent, while placed last here I would like to refer to it first, takes air cooled condensers, plus a few of the other well known elements like compressors and so forth, and puts them below the box, as we express it—that is, where you keep your food. Now, the Wolf one shows those same elements above the box, and Wolf preceded in his filing date the Kramer patent.

Now, we believe that this suit is an attempt to convey invention into shifting of the same elements shown in the Wolf patent below the box. Now, the Wolf patent itself recites elements that are individually old and collectively old, as far as results are concerned. The only new important element being the air cooling.

Now, I think your Honor is sufficiently aware, without being pointed out specifically at this point, that air cooling for automobiles, distillation of liquors, and so forth, by air, as well as by water, is such a familiar thing that for an ordinary mechanic to adapt it to a particular industry, we do not believe requires invention.

Counsel Charges Suit was Brought to Throttle the Trade.

Now, we made a rather broad statement, that we believe this suit is more an attempt to throttle the trade. It was first brought against General Necessities after notice of eight patents had been served on them. It was very quickly thereafter brought with seven patents and an unfair competition charge. That was very well advertised, and so forth.

After we got a stipulation as to defendant's machine, answers to interrogatories, they withdrew four of the seven patents and the unfair competition charge, leaving three patents.

I understand this morning that Mr. Cooper desires to withdraw a third one. Is that correct, Mr. Cooper?

Mr. Cooper: Yes, the Joy patent we withdraw. However, you have heard of that before.

Mr. Frye: Not specifically. I believe that Mr. Morrison referred to it, but it has not been on the record that I know of, in any way.

Mr. Cooper: No. Well, we redeem our promise, and withdraw it.

Mr. Frye: Well, that is all right.

Now, there are two patents left, and we believe those two have the broadest possible claims, so as to cover not only our particular construction, but practically any air cooled construction on the one hand and any unit construction beneath the box on the other. In other words, defendant has avoided practically every other patent, and they have admitted so by withdrawing to the point that we are now faced only with this problem: Either these very broad claims are valid, and so this defendant is an infringer, or else there is nothing to hold the refrigerating art from development by such small companies, relatively, as General Necessities.

Now, the particular constructions are rather clear. We have the machines that are stipulated here, and I think it would be just as well to wait until after the plaintiff has put on their testimony before introducing specific defenses. However, if your Honor desires, we would be glad to show what patents and so forth show air cooling and what show the unit mounting, or what-not.

We are subject to your Honor's desires at this point.

The Court: I will leave it for you to decide which will be most desirable. You are in better position at this time to judge than I am. I will want you to help me all that you can, I need all the help I can get, but I will leave it to you as to the way you do it.

Mr. Frye: Well then, we will leave it.

The Court: If that completes the opening statement, we will take a recess.

(Recess.)

(Continued on Page 14)

OPINION OF THE COURT

(Continued from Page 12)

give much credit for taking across that bridge into the kitchen refrigerator art, anything found outside in the big general refrigerating art. The claims in the patent read on to Leslie, and it does not seem to me it is difficult to do it or put on any strained construction, but the only fair thing to do.

The patent to Palmer granted December 16, 1902, is the best reference so far as its having been put into actual use.

He built something like ten of those cars and they worked, they used them; see some reasons probably in addition to lack of capital and organizations in opposition to it, the fact that they did not run when the car stopped was perhaps one trouble with it, and the whole proposition of changing from using ice for refrigeration has been a slow process for many reasons. I suppose with the cars, much the same as the kitchen, you found them all equipped, the whole railroad situation equipped for refrigeration with ice, and it is the kind of a problem that you could hardly expect them to go gradually—they would either have to go sled length, or not go at all. Railroads run that way, necessarily carry on their business in that way.

Judge Tuttle points out the significance of competition between industries in modern business.

And again, while I am talking about the movement, the development of it, you take it with artificial refrigeration in the kitchen and the homes, it has been a problem of educating the public to it, and there, again, you found the men selling ice, naturally opposing it; in fact, the competition of today, as I see it, is not so much between competitors in the particular department of the art, as it is between departments. The real competition today in this art, as I see it now, is not so much between these men making household refrigerators, as it is between that and the people who are furnishing them ice, and they are filling their houses in that way:

And so in the whole world around today, the competition,—why, the growers of oranges, they are spending thousands of dollars to get people to eat oranges, and other people to get them to raisins, and the people that are producing apples had better get busy and begin to try getting them to eat apples but it is not so much competition between the orange producers, the different men producing oranges, as it is between the men producing oranges in competition with the men producing apples.

Even when you step in in the morning the contest is not between men that raise the humble prune, but it is between the prune raisers and the grapefruit raisers as to which you will have for breakfast, and the one advertising the most,—and the whole game of today has developed in that way. So that here, the battle of competition here, as I see, has not been between water cooled and air cooled, it has not been between Frigidaire and Kelvinator, but it has been between the sellers that were selling ice and the fellows that were selling a small machine that they did not have to buy ice. I believe there is where has been the big competition during the past decade, and that the battle has been fought out along that line, and therefore has been a slow battle. I believe that is one of the reasons why this has been a slow battle. And that same line of thought, I think, spelled the misfortunes of Palmer. He did not have any competition in his cars, but he had very big competition, from ice, and I guess the ice won out.

But Palmer is a good reference, because of the fact that he made an operative, useful, good car, it did the business the way he claimed it to do, so far as the thing we are talking about, just as well as though he made a lot more, I take it. I believe the most valuable of these five prior references is Martin and Beath. I believe there is more real meat in it. I believe Martin and Beath taught the world and the art more about how to build a refrigerator than any one of those five, and I think they very nearly told the story about the things in this patent, having got a bridge to come across on, and Wolf did not build that so we cannot give him credit for that, of thinking of fetching into the kitchen and the home these useful things out of the ice making and the refrigerating art as a whole,—cannot give him credit for that.

Why, I think that Martin and Beath taught the story about the sizes, and having selected your refrigerant, I think a very important thing there was when they said 16 foot of movement to the second and then told how,—that seems to be the gauge,—and then to take your refrigerant with its qualities, then the work you wanted to do, and then your tables, from mechanics and your arithmetic, and I think Martin and Beath was the helpful patent out of the group.

Some things about it, it is not so easy to read these claims on to it, but as a matter of fact, to weigh it up for its worth, I believe that Martin and Beath is the patent that weighs the most, and I think it is enough to defeat this patent of Wolf; Martin and Beath alone.

Now, I have not any idea, however, that Martin and Beath, or all these patents down including Wolf, tell anybody how to build a refrigerator well enough so that you are not going to have a lot of work to be done by the skilled and highly skilled mechanic in this line. It is the sort of thing that, if you destroy all the figures and drawings that all you gentlemen have got, and send a man away to make a refrigerator today for a new place and a new size, you will make several of them and several drawings and several tests before you get it the way that you want to put it on the market, so it will not only sell, but stay sold. It is that kind of an art, it is that kind of a job and we have to take that into account; and I was impressed with that same thought here yesterday by our friend from General Motors here,—

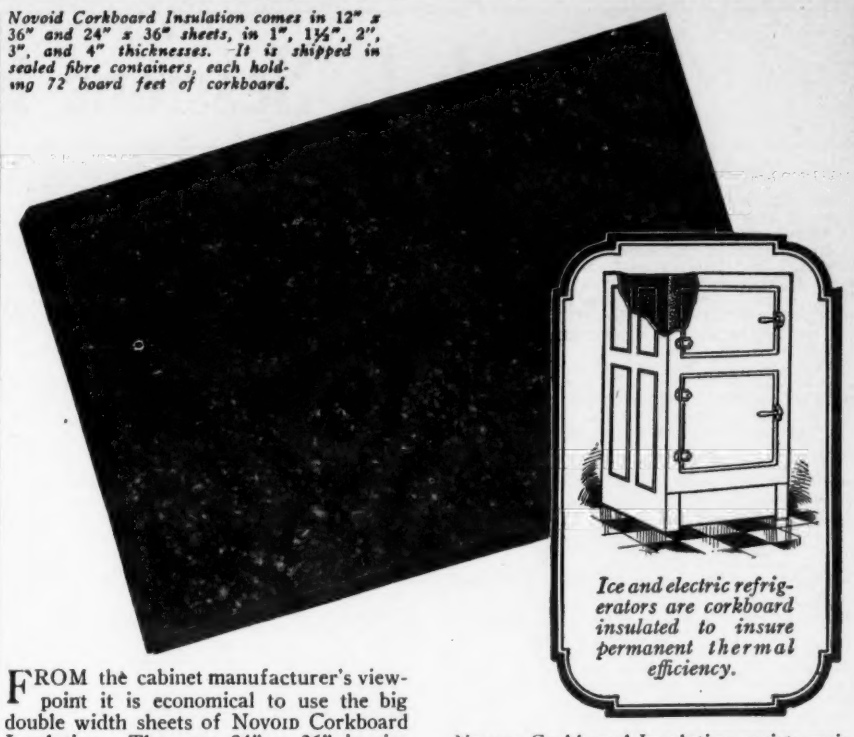
Mr. Frye: Mr. King?

The Court: Mr. King, yes. He really worked this out, and got his size on this thing with just as much effort, and using his own skill, just as much as if the Wolf patent had never been made. His testimony shows that, and it was not a case of taking the Wolf patent and building that the way Wolf says.

These things are so well known, and have been for years, that during the last ten years, 20 years, it has not been a problem, it has not been the kind of a job in my judgment where the engineer, skilled mechanics of a concern that wanted to build one of these things, get the patents and study them, but they know these general principles,

(Continued on Page 14)

Novoid Corkboard Insulation comes in 12" x 36" and 24" x 36" sheets, in 1", 1½", 2", 3", and 4" thicknesses. It is shipped in sealed fibre containers, each holding 72 board feet of corkboard.



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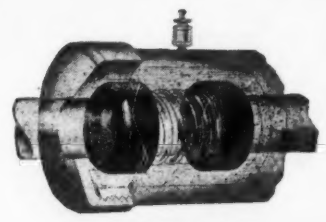

Cross section view, style No. 3 Cooke Seal Ring

By stopping leaks it makes sales

Let one single part of an electric refrigerator prove defective and the public promptly magnifies the evil and condemns the entire machine. Generally the trouble is simply leaking refrigerant—and the pity is it can so easily be avoided!

The Cooke Seal Ring absolutely prevents refrigerant leaks. It is a product born in the household refrigeration industry. It was first used to hold ammonia—most volatile of all refrigerants. Now used on every type. Gruelling usage does not lesson its efficiency—in fact, it shows no appreciable wear after years of constant service. Hundreds of thousands in use, the world over, prove its practicability.

In principle it is simply a ring which rotates with the shaft and, backed by a spring, forms a ground joint against the face of the gland, being frictionally tight *on* and sealing *along* the shaft.

Many manufacturers in this industry have adopted it as standard equipment. More are doing so each month. If your refrigerator operates with a revolving shaft you need this ring. Use the coupon for full particulars.

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Frank L. Sessions Explains the Refrigeration Process

(Continued from Page 13)

Mr. Cooper: I will offer in evidence a copy of the Wolf patent in suit, 1337175. It has been already marked "Exhibit 1."

And a copy of the Kramer patent in suit, 1280765, and then I will offer in evidence a certified copy of the disclaimer as to the Wolf patent; it is printed on Exhibit 1, but this is proof that it was actually made.

I will state that the answer admits that the defendant got notice of infringement before the suit, so that there is no occasion for proof of that, and as a part of the trial minutes I will state that the claims of the Wolf patent involved are 10, 15, 16, 18; and as to the Kramer patent, claims 3, 4, 5, 6, 7 and 8, and I will further state that the plaintiff withdraws as to the Joy patent which was declared upon in the complaint.

Assignments of the Wolf patent.

I will now offer as a single exhibit the assignments that relate to the Wolf patent, down to and including its assignment to the Delco Light Company, the original plaintiff, and those assignments in this single set of papers are, first, of the Wolf Patent, to the Mechanical Refrigerator Company of Arizona; second, from the Mechanical Refrigerator Company to the Isko Corporation of Michigan; third, by Isko, Incorporated of Michigan to the Isko Company of Delaware, and fourth is an order approving the bond of the Central Trust Company of Illinois as trustee in bankruptcy of the Isko Company, a bankrupt; and fifth a decree by the Central Trust Company, the Trustee in Bankruptcy, to J. R. Fehr; the sixth is a consent of the Isko Company to transfer to Fehr, the seventh an assignment by Fehr to the Delco Light Corporation; and the eighth, an order of the Receiver in bankruptcy of the Isko Company confirming the sale to Fehr, and the ninth an assignment from the Central Trust Company of Illinois as Receiver of Isko Company, to the Delco Light Company, a Delaware Corporation. That is Exhibit 4.

The Court: That is admitted.

Mr. Cooper: This single exhibit, the notice of assignment relating to the Kramer patent, down to its acquisition by the Delco Light Company, the original plaintiff which comprised first, the assignment of Kramer to the Uhlman McLloyd, second an assignment from Uhlman McLloyd to Frigidor Corporation, third an assignment from Frigidor Corporation to Balsa Refrigerator Corporation of New York, fourth an assignment of Balsa Refrigerator Corporation of New York to Schwarz, and fifth an assignment from Schwarz to the Delco Light Company. That will be exhibit 5.

Then I offer in evidence an assignment of many patents, including the Wolf and Kramer patents in suit, from Delco Light Company, the original plaintiff, to Frigidaire Corporation, the substituted plaintiff.

A stipulation has been made between counsel for the respective parties which I can state on the record, I think, without putting the entire document in, to the effect that uncertified copies of patents may be offered in evidence, or printed publications, such as books, periodicals, magazines, and the like, or reproduction of the copies may be offered and used in evidence, and that prior to the commencement of this suit, and at a date later than June 19, 1924, the defendant here made and sold within the jurisdiction of this Court a certain refrigerating apparatus, which bore the signatures of counsel on both sides at that time, identifying the cooling coils of a refrigerating apparatus; this separate set of cooling coils being offered for the reason that the cooling coils in the refrigerator as a whole are enclosed in metal sheaths and are not available for examination.

The refrigerator I will now offer in evidence—

The Court: The stipulation is exhibit 8?

Mr. Cooper: Well, I am merely stating it.

Mr. Frye: We do not need any number for the stipulation.

Mr. Cooper: Then the machine I offer as exhibit 7, and the separate coils exhibit—

The Court: That is defendant's refrigerator?

Mr. Cooper: Yes, defendant's refrigerator. And exhibit 8 is the cooling coil, which is a duplicate of that which is enclosed in exhibit 7, but this exhibit 8 has had the sheathing removed, for the most part, so that there can be a ready examination of the arrangement of the coil itself.

There is another stipulation, the substance of which I will state in the record, which is that the Frigidaire Corporation is a corporation organized and existing under the laws of the State of Delaware, that being the allegation of the amended and supplemental bill, and I will also say that the corporate existence of the defendant is admitted in its answer.

The Court: The defendant is a Michigan Corporation, and the Plaintiff a Delaware Corporation?

Mr. Cooper: Yes, your Honor.

Mr. Frye: Regarding these exhibits, we have no objection against any except the disclaimer, which is marked "Exhibit 3," and we would like to go in subject to the objection that we believe the disclaimer itself is bad and should never have been accepted by the patent office, and we desire to have it reviewed by this Court.

The Court: It may be received subject to that objection, and you may have an exception to its receipt, and later bring to the Court's attention what you wish to say about it.

Mr. Cooper: I suppose it stands in the same case as the patents themselves, having been proved, as we have proved it, it stands before the Court, and like all patents, if it is legally ineffective, that is a matter of substantiative defense.

Mr. Frye: We understand it is admitted subject to objection.

The Court: Yes, it is admitted.

Frank L. Sessions was thereupon called as a witness on behalf of the Plaintiff, and having been first duly sworn, testified as follows:

Frank L. Sessions of Cleveland gives expert testimony for Frigidaire.

By Mr. Cooper:

Q.: Where do you live, Mr. Sessions?

A.: I live in Lakewood, a suburb of Cleveland, Ohio.

Q.: And what is your business?

A.: Consulting engineer, with offices in the Rockefeller Building in Cleveland.

Q.: Have you been technically educated, and if so where?

A.: I was—I took the mechanical engineering course at the Wooster Polytechnic Institute, and hold a degree of mechanical engineer from that institute.

Q.: What has been your experience as a mechanical engineer, and in that connection have you had to do with developments in the nature of inventions and patents for inventions, and state your qualifications generally, including any that relate particularly to the subject of refrigeration?

A.: Since my graduation at the Wooster Polytechnic Institute in 1889, I have been continuously in engineering work along mechanical and electric lines. I have held engineering positions with a number of manufacturing concerns, the Denstein Pump Company, at Holyoke, Mass., the Ft. Wayne Electric Company at Ft. Wayne, Indiana, for nine years, the Stinness Electric Company of America at Chicago for a year and a half, the Brown Hoisting & Conveying Machine Company of Cleveland, Ohio, for a short time, and I was for eleven years chief engineer of the Jeffries Manufacturing Company at Columbus, Ohio, manufacturers of mining machinery and lifting and conveying machinery, and I was for two years general superintendent and engineer for the Standard Welding Company at Cleveland, Ohio, and since 1914 I have been an independent consultant, and I have been called upon to study and analyze and report upon industrial processes and machines. I have designed machinery all my life, and have had to supervise the designing from an engineering and manufacturing point of view. I have had occasion to study a number of mechanical processes involving heat, and have familiarized myself with the refrigerating problem.

I have never been actively engaged in refrigeration, but I have been familiar with refrigeration for many years, and during the last year or so I have made a particular study of the question, since I became connected with this case.

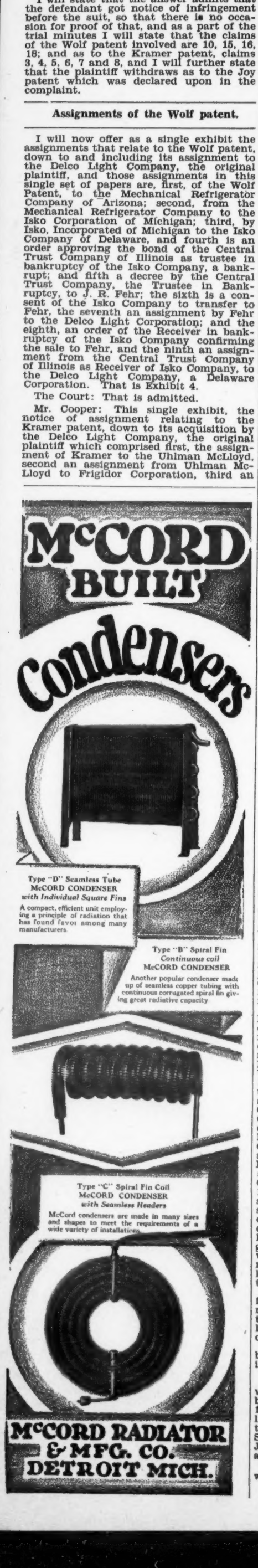
I have testified as an expert in a number of patent litigations, and some of them in the Michigan Federal Courts.

The Court: Which cases were you in?

A.: Universal Rim versus Kelsey; Budd versus Wilson, not before your Honor, but before Master Sayers, and also a case before Judge Sessions at Grand Rapids; Elliott Machine Company versus Toledo Button, and last year, I think before Judge Simons, Gordon-Lathe Company versus Jackson Motor Shaft, or some such name as that.

The Court: I was wondering if there were any cases I had.

(Continued on Column 5, this Page)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OPINION OF THE COURT

(Concluded from Page 13)

and it is the kind of problem that they begin and work out and try it out and experiment, and finally get something that suits them. I can see many reasons for the present success of this air cooled product of the plaintiff, very very many of them, but I cannot trace it to Wolf, or anything contained in Wolf. I cannot trace the success to that; I do not believe it was that.

I am not minimizing the amount paid for this patent, but it was not substantial in my judgment, considering the number of patents acquired. I don't think that great weight, great importance was attached to this patent when it was purchased, and I do not think it had it. There is a large number, several of them included in this very suit here, and we finally get down, we have got this one left. Nothing about the investigation made of this patent at the time, along with that large group, or the amount paid, that I think ought to cause any unusual imporance to be attached to the patent. I am not minimizing it, but there is nothing about that purchase that should cause the Court to give to this patent any more than it otherwise would, it always would.

Now, as to the development of it, I do not think that anything in the development of this art that points to this patent,—quite the reverse. The patent was applied for, years elapsed, the patent granted, years elapsed, it does not revolutionize any art. Years later when one of the, if not the greatest selling organization in the world, comes into control of it, why, it has developed not in any startling way, but it has gone along with this battle between the man selling the dirty ice and the man selling the machines, so that the ice man does not have to come into the kitchen. There is just the battle, and they have gone along with it, gone along fine. It possesses very many things, that you can look at, that would account for the sales made, and then add to that the push back of it to sell it, and you find plenty of reasons for all the sales that have been made without the Wolf patent, and I do not think the Wolf patent has contributed to the development of this art in any way, or to these sales in any way. It is the skill in the first place, and then this battle going on, in which the machine that will make the ice in the home is gradually winning out. That battle has been going on, that is, of the sales; and then in addition to that, this very fine article that has been produced by this skilled organization, through its genius applied to all the different parts, like the service, probably the kind of a motor used, and how good it is,—that enters into it, but you cannot trace that to Wolf at all. The thermostat, the presence of the thermostat, the accuracy and durability of that, have much to do with it. If it did not have a good thermostat on it, it would not stay sold; that has much to do with it, more to do with it than Wolf.

I do not find in the sale, or what has happened in the history of the art, that you can trace anything at all to this patent, and I do not think it is entitled to anything from that source.

As a patent, I feel very safe in saying it is anticipated by the prior patents, anticipated by what was done, probably taken that machinery off of the open top, as the first owners of this patent, the predecessors of the plaintiff, but the owners of the patent, an open lot of machinery up on top of the ice box, that change from that position down under the refrigerator, or into an enclosed place, undoubtedly added to the sales and the desirability of the machine. I can see many, many things that tell the story of why there has been a demand created, and possible to create a demand for the plaintiff's device, but I cannot trace any of it to Wolf; I do not find that Wolf has any part in it at all. I do not think it helped the plaintiff one iota—that Wolf patent—I do not think it helped the plaintiff or plaintiff's engineer one iota in building that fine structure that I can see out in front here.

That is my feeling and my conclusion about it. I believe every one of these claims are void. They all go down to the prior art.

Number 10 does not have any fan, or any motor in it, so it perhaps reads more readily on to these other structures, but that is one of those that the disclaimer brings in the ⅜ inch copper tubing. Now, after that ⅜ inch copper tubing which I hold is in the patent, with the same force that it would if it had been claimed and allowed originally, the prior art is full of all the different kinds of condensing coils and expansion coils that we have today, and in various kinds of material, using various kinds of refrigerants in them, putting in different forms, I cannot help but feel that it would be as unfair to now allow, or at the time this application for patent was made, back in 1913, it would have been as unfair, as I see it, to have allowed Wolf to control the ⅜ inch size of copper tubing in that old combination, absolutely old, to let him control the ⅜ inch copper tubing, as it would to have a carpenter today name certain kinds of nails to be used in building houses.

That, of course, is not in any of these old patents, expressly read into it. We find it in the expansion coils, that size definitely mentioned, but you do not happen to find it in the condensing coils, the exact size. We find copper, all kinds of refrigerants mentioned; much of the stress is placed on the forms of air cooling, but air cooling was old, air cooling was old in this combination except we say this ⅜ inch copper tubing; it was old in the combination. And having brought so many things from the general art across the bridge into the kitchen refrigerator art, even though Wolf was the first to cool in the kitchen with air, I do not think that would entitle him to a patent.

So, without further discussion with these rough broken sentences, I have reached the conclusion that this patent is not good.

When I go down to the later claims, I find the fan, I find that in the art, and I find it in every kind of a position, cooling all the different parts; I cannot see a patent.

I will hold the patent as to all of these claims here in suit, void. Decree will be entered dismissing the bill.

Mr. Byrne: Without prejudice, if your Honor please, as respects Joy and the Kramer patent?

The Court: Yes, the other patent has not been considered by me at all. I have not any opinion about it.

Mr. Frye: Costs follow the decree, your Honor?

The Court: Yes.

(Whereupon an adjournment was taken.)

The Witness: I have never been before your Honor, but I have been before Master Sayers.

Q.: Have you read and do you understand the two patents in suit, the Wolf and Kramer patents?

A.: I have

Q.: Have you examined and are you familiar with the plaintiff's exhibits 7 and 8, being the defendant's refrigerating machine as a whole, and exhibit 8 being the cooling coils, and their immediate adjacent parts?

A.: I have.

Action of refrigeration machine in removing heat is compared with sponging water out of a boat.

Q.: Now will you explain the subject of the Wolf Patent, so far as it may be necessary in connection with the claims which are here involved, being 10, 15, 16 and 18, and going, as much as may be necessary in order to make your explanation clear, into the facts of refrigeration?

A.: I don't know just how familiar the Court may be with the problem of refrigeration, but at the risk of being very elemental, I am going to give a homely illustration of an analogous operation that may assist the Court to an understanding, which is what we are trying to do in this apparatus. The object of this refrigerating apparatus is to get rid of heat. Heat pervades everything and leaks through everything. There is no perfect insulator of heat known, and while a refrigerator may have the best modern insulated walls, there are heat units, that is, great quantities of heat continually seeping through these walls, almost perfectly insulated walls, and the object of this apparatus is to take that heat out. The homely analogy I have in mind is that of a man in a boat. He may have some provisions that would be spoiled by the water spread upon the seat or upon planks in the bottom of the boat, and the boat is leaking. There is an inexhaustible reservoir of water surrounding him, and the water continually seeping through the leak in the boat, and he must bale it out. Suppose he has a sponge. By wetting the sponge and wringing it out over the side, he can, if he is active enough, he can bail the water out of the boat to such an extent that he may use his oars for a time, and then the water will seep in through the holes, and he will have to go to work again. Now, in modern ships this process of keeping the water out of the bilge is done automatically by a pump that is operated when the water rises to a certain level, and the pump acts until the water falls to a certain level, and the pump starts and remains idle until it raises again.

Now, in these refrigerators the mechanical iceless refrigerators, the refrigerant, sulphur dioxide, in the plaintiff's apparatus, corresponds to the sponge that the man uses to mop up the water from the boat. This refrigerant is circulated through the food box, through coils in the food box, and absorbs heat, the heat being analogous to water; and then this refrigerant is lifted out of the food compartment, squeezed, and the heat wrung out of it, it is exhausted of its heat and returned into the box to absorb more heat, and again be brought out to be rid of its heat, and that is the cycle that is going on continuously, and in order that the simplest form of motor may be used, a constant speed motor, one which will make so many strokes of the compressor for pressing the gas, every minute, and not operate all the time, but to meet all the conditions involved, these machines are adjusted so they operate only part of the time, and automatically, when the temperature is reduced, we will say to 38 degrees at a certain point in the box the machine gets out of operation and stops and remains idle until the heat has again seeped through the insulating walls of the refrigerator, and raises the temperature up a degree or two, when automatically the machine starts and again removes the heat from the food box; that is the cycle that is continually repeated, and it is obvious, your Honor, that in a warm kitchen the cycle will be repeated oftener than it would be if the box were placed in a cellar or cool room. In fact, in the winter time, if the refrigerator be in a hall that is only 50 degrees of temperature, the problem of refrigeration and the cost is much less than in the summer when the surrounding temperature is up to 80 or 90 degrees. That is the general problem, to remove the heat from the food box to prevent decomposition of the food.

The Wolf patent, number 1337175, of April 30, 1920, provides for a process and apparatus for refrigerating. As the patent states in the paragraph commencing with line 14 and ending with line 24, the apparatus involves the compression of the refrigerant, and it is primarily for domestic purposes, that is, for household use, designed to obviate various defects and disadvantages of systems in prior use, which disadvantages the inventor describes.

The construction and arrangement of the apparatus is described on page 1, commencing with line 68 of the specifications. Ten is the refrigerator which has a food compartment in the lower part, and the shelf, 11, near the top of the compartment, which supports an expansion coil, 12. This expansion coil is one in which the refrigerant is changed from a liquid to a gas. Now, in changing from one condition to another, as from a solid to a liquid, or from a liquid to a gas, heat is either required or evolved very much more so than in the mere expansion of a body, or a gas. For instance, the unit of heat, known as the British Thermal unit, is the measure of heat quality. It was many years ago determined by rather crude experiments, and has since been determined by accurate scientific experiments, to be equivalent to a certain number of foot pounds of work, that is, if all of the heat evolved from friction could be put into a pound of water it was found 778 foot pounds of work done upon a pound of water, or the heat from 778 foot pounds of work being absorbed by a pound of water would raise the temperature of that pound one degree.

Now, the unit of heat therefore is the quantity of heat that will raise one pound of water one degree between the temperature of 32 and 212 Fahrenheit, that is, between the freezing point and the boiling point of water. Now, to change to the pound of water, required 144 heat units, that is, you must extract from a pound of water at 32 degrees, the freezing point, 144 heat units to freeze it, so that the amount of heat involved in changing from a liquid to a solid, or vice versa, or changing from a liquid to a gas, or vice versa, is very much more than that required to raise the temperature of the liquid as a liquid, or the gas as a gas. Sulphur dioxide—

The Court: I don't just catch what you say about the 144 heat units will change the water from what temperature to ice?

(Continued on Page 15)

Functions of the Compressor

(Continued from Page 14)

The Witness: The act of freezing at 32 degrees requires the removal of 144 heat units from the pound of water to change it from water to ice.

The Court: After it reaches the same—

The Witness: Practically the same temperature, yes, sir. That is what is called latent heat. It does not affect a thermometer, it is molecular heat that involves the rate of movement from the molecules, scientists tell us.

Now there are a number of refrigerants, as Mr. Cooper has pointed out, generally they are what we know as volatile gases, or gases that have—that can be liquefied under commercial pressures, that being a low boiling point. With a refrigerating apparatus—

The Court: All lower than water?

The Witness: Yes, very much lower than water. A refrigerating apparatus must include a compressor for compressing the refrigerant, the gas, to such a pressure that its temperature is higher than the cooling medium that is used for cooling it in the condenser. For instance, one of the claims I heard Mr. Cooper read this morning, that claim means pressing the gas to a pressure, the corresponding temperature of which was higher than that of the surrounding air.

The Court: The heat was something that you were not trying to get, but you had to get in the compression.

The Witness: Well, it is putting the heat into a condition by which we can heat it, into a condition which will permit us to get rid of it. The heat in the food box that comes from the heat—the heat in the gas from the evaporator, the gas may be cool, that is, the gas in the evaporator may be below the freezing point, and as that comes into the condenser—the compressor, the gas is condensed and the heat all shoved into a small volume, raising the temperature into—if the temperature be not above the temperature of the cooling medium, the air or water, there will be no exchange of heat, we won't get rid of it, so we must raise it up to, you might say, a thermal potential, so that it will be imparted to the surrounding air or water; if water is used as a cooling medium, and having rid the refrigerant of the heat it liquefies at a relatively high temperature, and practically that of the atmosphere, is passed into the evaporator or cooling coil, and in changing from the liquid to the gaseous state it withdraws heat from the air in the food box. It requires that heat to change it and gives—it requires the latent heat—

The Court: In other words, if you have a well in the back of the boat, used as an illustration, that you used, it increases the amount of water and gathers it into a point where you can get hold of it, and I take it you do that with your heat?

The Witness: Yes.

The Court: Your heat was scattered all through your gas, but you gather it all down into a little bunch where you can get rid of it?

The Witness: Yes, sir, or, apply the sponge, as in the illustration.

The Court: By the condensing and compressing of the gas into the liquid, the total quantity of heat is not changed, I take it, but you, by compressing it in less volume, at a great temperature—

The Witness: Well, you transfer the heat—that is what happens when it compresses.

The Court: The total amount of heat present after compression is just equal to the amount—

The Witness: Yes, the amount that was in it originally.

The Court: But you gather it into one place, and consequently the amount of heat, if you put it down into cubic inches, you increase the temperature 144, I take it?

The Witness: Yes, that is, you are speaking now of water?

The Court: Well, anything. If you take a total amount of heat—

The Witness: Oh, I see what you mean.

The Court: I squared it, but that is the thought, as I understand it.

Mechanical work is performed in compressing the gas and heat is developed.

The Witness: Yes, that is a perfectly correct way of looking at it. As a matter of fact, the compression of the gas requires mechanical work to be done to reduce it to this small space, and the performance of that mechanical work develops the heat in the gas, that is, you must perform mechanical work upon the gas in compressing it.

The Court: It is not friction heat that you are getting there, is it?

The Witness: No, it is—

The Court: That is what I want to be clear about. I got the idea from what you said that—well, take the sponge, you have got a sponge that has water scattered through it, and we will say you compress it to half that amount, and you have got the same amount of water in half, and I am wondering if it is right, heat is scattered through it, and you simply bring it into a smaller space, keeping the same amount of heat you had through the other area, therefore increasing the temperature at the expense of area, and do I understand there is something about the mechanical process other than that, or a mathematical problem, or is there some theory of friction or something?

The Witness: It is the mathematical problem.

The Court: All right.

The Witness: So far as the heat we are keeping up is concerned, it may be said to be in the gas as it enters the compressor before compression and is, by reducing the volume of gas and increasing the pressure, the temperature of the small volume is very much increased and will part with its heat very much quicker than it would—

The Court: Therefore, having compressed it, and obtained the increased relative temperature, you can cool or get rid of that temperature, or that heat by the surrounding medium, that would not do the job before?

The Witness: Yes, sir.

The Court: You put it above the temperature of the surrounding medium which now serves as a cooling medium?

The Witness: Yes.

The Court: I think I have got the idea.

The Witness: And the advantage of using the refrigerants of low boiling points is that they may be converted from liquid to gas, or from gas to liquid at low pressures. If this ammonia gas be used, as Mr. Cooper pointed out to you, the pressure, in order to reach the point where the ammonia will boil at 80 or 90 degrees, the pressure must be raised to 150 or 160 pounds. This is rather uncomfortable pressure; that is, uncomfortable from a sense of security to the householder, to have a system of pipe carrying 160 to 180 pounds, or even more.

The Court: It may explode?

The Witness: It may explode, and cause a serious accident. The sulphur dioxide reduces to a liquid at 80 degrees temperature and 45 pounds gauge pressure. The 45 pounds is a very simple, small pressure, to be handled mechanically. The fittings and the pipes and the compressors and the necessary packing joints, where they are used, can be made to withstand the pressure very readily, so that is one of the chief objects of using sulphur dioxide; and another one is that in changing from liquid sulphur dioxide to gaseous sulphur dioxide, a pound of the substance absorbs about 142 heat units, equal to substantially the same as the heat units that must be extracted from a pound of water to convert it to ice. That is, it has the latent heat, as it is called, the latent heat of liquefaction is high.

Patent describes pulley constructed so as to form a fan.

Continuing the description of the patented apparatus, 13 in the patent drawing is the compressor which is shown mounted on top of the refrigerator, and 14 is the motor for driving the compressor. It is also mounted on the top of the refrigerator, and is bolted to the compressor to operate it. The driven pulley is described at line 85 of the first page of the specifications. "Driven pulley 15 is made heavy so as to act as a fly wheel, and preferably has spokes 17 constructed to form fan like spiral blades which act to produce a draft over the top of the refrigerator and effect a continual change of the air in and about the apparatus."

That is, the air being the cooling medium, the fan causes it to circulate over the pipes into which the compressor discharges compressed gas, and by extracting the heat from the gas in the condenser, the gas condenses to a liquid and is then passed through an expansion valve into the cooling coil, 12, or expansion coil, it is called in the patent.

Then the specification commencing on line 96 refers to the specific type of condenser.

The Court: Where is that in this drawing?

The Witness: 12 is this pipe, which is a coil. It is shown only in elevation here.

The Court: Now, where is the cooling duct?

The Witness: Right in here (indicating).

The Court: And this fan drives the air?

The Witness: No, the fan drives the air through this crib, cage, above the refrigerator, drives it to circulate it around there.

The Court: Well, is there where the liquid is cooled?

The Witness: That is where the liquid is cooled.

The Court: This cooling coil that you referred to,—

The Witness: It is in the food box.

The Court: You referred to the cooling that comes, the picking up of the heat.

The Witness: Yes.

The Court: I was thinking all the while,—I was trying to think of that operation of where the air takes up the heat from the coil, and not where the coil takes up the heat,—it is just the reverse operation. Up here, I take it, the air is cooler than the condensed liquid?

The Witness: Yes.

The Court: And the air is receiving the heat from the coil up there?

The Witness: That is correct.

The Court: From the hot liquid coil. Down below, when it has got into the gas, it is cooler than the surrounding air, and it is taking up the heat back, is that it?

The Witness: Yes, very much colder than the surrounding air.

The Court: So, it is grabbing off whatever heat there is in the air down there?

The Witness: Yes; and I will try to refer to the condenser as the condenser and to the coil inside of the refrigerator as the refrigerating coil.

The Court: Is there any place where I can think of the thing as not having heat in it? Does it ever get to that point where I can think of it as not having any heat?

The Witness: Only in theory.

The Court: That is, relative.

The Witness: Yes, relative.

The Court: In other words, whenever there is something colder, it will take the heat from the other substance.

The Witness: Yes, yes sir.

The Court: And you never reach a point where you can say that there is no heat?

The Witness: No, the absolute zero exists only in theory and relatively. You reach a point where there is no heat, and then I don't know what would happen if you went beyond that.

The Court: So whenever we measure heat, then it is a relative term?

The Witness: Yes.

The Court: There is no such way as in measuring water?

The Witness: No.

The Court: So there is no way, like saying there is so much water,—you cannot do that with heat?

The Witness: Well, we measure heat by the work it will do. Heat is a form of energy, considered so, and in that way we measure the heat, but the temperature which may be called heat pressure, we measure by an indicating thermometer.

The Court: Well, is heat an atomical movement, or molecular or mechanical?

The Witness: It is supposed to be an atomical or molecular, due to atomical or molecular movement. The theory is that the hotter a body become, the more rapidly do the molecules move, or they move through larger orbits and impinge upon each other and develop the heat.

The Court: But there is a tendency, whatever the heat may be, there is a tendency for it to harmonize with everything that comes in contact with it.

The Witness: Yes.

The Court: From a heat standpoint: in other words, for the heat from the hotter body to be taken up by the thing that is not so hot?

The Witness: Yes. That is, it is analagous to the level of water. Water seeks its level, wherever it can, and heat seeks its uniform temperature.

The Court: And either refrigeration for the ice box or warmth for the body, one of the problems is building a wall between those of different temperatures, to keep the heat in, not to keep the cold, really?

The Witness: Yes, to attempt to insulate.

The Court: That is what I say,—we are always insulating. If you are going to have one side closed, and the other not, it would want to be the side towards the heat, woudn't it? The tendency is the flow from the hot to the cold?

The Witness: Yes.

The Court: Not the cold to the heat, but heat to cold.

The Witness: Yes. You must put your insulation between the two bodies or spaces whose temperature you wish to maintain different.

The Court: Yes, but I say, if we could think of it in the way of flow, it is not the flowing of the cold to the heat, and the cold making the—now, going into the heated body, but it is heat going out of the higher temperatured substance into the colder one?

The Witness: Yes, that is always the case. Heat flows from the hotter body to the cooler body.

The Court: You have been telling me about that cooling coil, and I had the wrong one in mind entirely.

The Witness: Yes. I should not have used terms that are confusing.

They are both cooling coils, one we will call the condenser and the other the refrigerating coil. As a matter of fact, they are sometimes called the condenser and evaporator.

The Court: We are thinking of it in what the coil is doing, but as to the coil itself, it is getting hot down there at 12.

The Witness: Yes.

The Court: The coil is getting hot, and thereby, what is around the coil, the space around the coil, is getting colder than it is.

The Witness: Yes. 12 is sometimes referred to as a boiler—you see, it changes the sulphur dioxide from a liquid to vapor or gaseous state.

The Court: When it is spread out again, it diffuses and the heat passes over a side space.

The Witness: Yes.

The Court: And ready to take on heat?

The Witness: Yes.

Condenser formed of a considerable length of copper tubing having a thin wall and ⅜ inch diameter.

Referring back to line 26 of the specification, the condensing coil is described as follows: "A condensing coil adapted for air cooling is indicated at 20. It comprises a considerable length of tubing, having a comparatively small cross section, and a comparatively thin wall to obtain maximum cooling. I have found that the best results are obtained by using copper tubing of about ⅜ inch diameter. As shown, the condensing coil is mounted above the refrigerator and it is exposed to the air throughout its length between the compressor 13 and the expansion coil 19."

Then down on line 16 of page 2 of the specification the inventor states that, "As many loops are used to make up the condensing coil as will be required to properly cool and liquify the refrigerant."

The Court: 20 would correspond, wouldn't it, with the radiator in the water system of an automobile.

The Witness: Yes.

The Court: It that the object, to cool?

The Witness: Yes, that is it exactly. It is the same function performed by the air passing over the coils, to cool the water.

The Court: Then what is the reason you could not use a radiator there. It would not stand the pressure?

The Witness: You mean a radiator of the type that is used.—

The Court: Like on an automobile.

The Witness: I doubt if it would stand the pressure, and its construction would be very expensive compared to the simple coil of copper pipe.

The Court: My first thought is about it, and what I am wondering about is, how you could cool that; you have it way up to that temperature there, and the amount of coil you have got, and the amount of air surface you have got, it is surprising to me that you would accomplish very much in the way of cooling with it.

The Witness: Well, it does not cool below the atmosphere. It is always above the atmosphere.

The Court: Yes, of course.

The Witness: But it is reduced to a liquid, and in that reduction to a liquid it gives up this enormous quantity of heat, the latent heat.

The Court: Well, the flow is not very fast, I take it, then, through that, is it?

The Witness: The gas in the pipe, the gas in the tube?

The Court: Well, no, your liquid. It is a liquid, isn't it?

The Witness: Well, it comes in as a gas, it comes in as a gas at the top.

The Court: Well then, do you get most of your cooling from this gas while it is still gas?

The Witness: Yes.

The Court: The theory I got out of what you told me was that you did not begin to do much cooling until you had got it compressed into this liquid, when its temperature was so much higher than the surrounding air, that then was a good time to cool it off.

The Witness: Well, no, in the compressor it never becomes a liquid. It is compressed to.—it is still a gas in the compressor when it starts into this condenser.

The Court: But before it gets to a liquid, then, it is much better than the surrounding air?

The Witness: Yes, and when it reaches the liquid condition in the condenser it is still better than the surrounding air.

The Court: Much hotter?

The Witness: No, only 10 or 15 degrees. It has cooled down to a temperature that is not—

The Court: Well, I should think changit from the gas into the liquid would make the temperature jump way up again.

The Witness: Changing from the gas to the liquid reduces the temperature of the refrigerant.

The Court: Wouldn't the liquid be hotter than the gas?

The Witness: No, it has given up heat, the heat has been taken away by the air that blows over the coil.

The Court: Yes, but you take just before it blows into the liquid and just after it gets into the liquid. I think on your

(Continued on Page 16)

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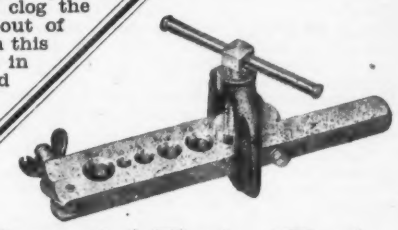

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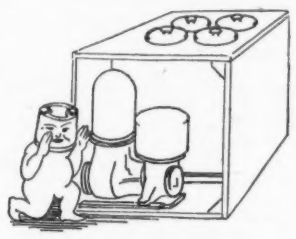

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How Pressure and Temperature Affect the Refrigerant

(Continued from Page 15)

theory,—I have been trying to follow it—that the liquid would be much hotter than it was before it became liquid. There is something there I have not got, yet.

The Witness: No, as it changes from the gaseous to the liquid state, it gives up a great quantity of heat, latent heat—not sensible heat that is indicated by a thermometer, its temperature does not change so much at the instant of liquefication, it merely changes its condition and gives up to the surrounding air this latent heat, which is a large quantity.

The Court: The heat is squeezed out of it, then.

The Witness: Yes, the heat is squeezed out, but it is not such heat as is known as sensible heat, not heat that will affect a thermometer. It gives up its heat, but it is not heat that can be measured by a thermometer. We start with the gas out of the compressor at a very high, relatively high temperature. I suppose that it reached 180 or 190 degrees.

The Court: When it begins to compress, the gas?

The Witness: No, after it is compressed. The gas that is fully compressed has got very high temperature.

The Court: By "fully compressed," you mean compressed enough so it is liquid?

The Witness: No, it is never compressed to a liquid state in this system. It is compressed only to a gaseous state.

The Court: Oh, we don't get any liquid in here?

The Witness: Not in the compressor. The liquid only comes after the gas, the hot gas has been reduced in temperature to the point where it will liquefy. It starts in, as the gas leaves the compressor, it might have a temperature of 180 or 190 degrees fahrenheit.

The Court: Then it is cooled until it liquifies.

The Witness: It is cooled until it liquifies.

The Court: But at that same temperature to which it is cooled, if it had not been compressed, it would not be liquid, would it?

The Witness: At the same temperature at which it is cooled, yes.

The Court: In other words, suppose you did not cool it at all, or let me say, suppose you did not compress it at all, but simply cooled it as much as you do, you would not get liquid, would you,—or would you?

The Witness: You would have to cool it to a very low temperature.

The Court: Much lower than you do?

The Witness. Yes.

The Court: In order to have liquid.

The Witness: Yes.

The Court: Compression helps us liquify?

The Witness: The compression aids the liquification, in that it enables you to remove the heat that the gases absorb, and reduce its temperature by cooling to a point, where it will liquefy.

The Court: Well, does this particular gas liquify at a given temperature, independent of pressure? I think the answer must be "No" to that.

The Witness: No. There is a certain temperature of liquification to every pressure.

The Court: Well then, by increasing this pressure you lower the temperature,—by increasing the pressure you lower the temperature point at which it will liquefy, is that right?

The Witness: No, just the reverse, your Honor. By increasing the pressure you increase the temperature at which it will liquify. The higher the pressure, the more difficult it is for the material or liquid to change to a gas.

The Court: Well, and the easier it is to change from gas to liquid, isn't it?

The Witness: By cooling,—

The Court: Yes.

Why the Gas is Compressed.

The Witness: Yes, by cooling. You raise the temperature by compression, and thereby, you arrive at a condition where you can get rid of the heat that is in the gas. It is hotter than the surrounding air and gives up its heat and reaches such a temperature that under the pressure at which it is compressed it will liquefy. At one end of the condensing coil, there is gas in the first turn of this condensing coil, liquid begins to form very soon after the gas leaves the compressor, only a few inches from the compressor liquid begins to form, and by the time the refrigerant reaches the lower portion of the condenser, it is all converted into liquid form.

The Court: Well, to use your mountain illustration, the only thing about that is that the air pressure is not so great up on the mountain top as it is down in the foot hills, and therefore, you get the boiling at a lower temperature at the mountain top, isn't that so?

The Witness: Well, the condenser. I illustrated the top and the bottom of it.

The Court: Well, I was not thinking about that. I know that is not enough to change it. But I say, all there is to the mountain top or the foot hills, the difference there is a question of pressure, is it?

The Witness: Yes.

The Court: That is the reason that the water boils when it is still as we should say, cold, up on the mountain top, because there is so little pressure?

The Witness: Yes, that is correct.

The Court: Atmospheric pressure?

The Witness: Yes.

The Court: So, here, when your pressure is high, it takes more heat to make it boil?

The Witness: Yes.

The Court: All right, I have got that point. One reason I stopped you was really not for the purpose of showing anything, but to let it soak in and let it get in my head before you go on.

The Witness: I am very glad if I can be able to give you a theory on which you could understand the subject, because it is not a simple subject for a non-technical mind to grasp without some homely illustration.

The specification, commencing with line 43 of the second page—

The Court: To go back again, I have not yet got what happens when you finally compress that from the gaseous state into the liquid state, what happens about heat?

PATENTS INVOLVED IN ORIGINAL DELCO COMPLAINT

The original bill of complaint by the Delco Light Company, Dayton, Ohio, (subsequently changed to the Frigidaire Corporation) against the General Necessities Corporation of Detroit filed June 17, 1926, by E. G. Biechler, Samuel E. Hibben, J. Ralph Fehr, and Charles J. Jolly charged infringement of seven patents as follows:

Kramer 1,280,765, October 8, 1918, claims 3, 4, 5, 6, 7.

Kramer 1,281,027, October 8, 1928, claim 1.

Joy 1,502,914, July 29, 1924, claim 9.

Wolf, 1,291,334, January 14, 1919, claims 1, 2.

Wolf, 1,337.175, April 13, 1920, claims 10, 15, 16.

Tibbetts, 1,276,450, August 20, 1918, claims 1, 2, 3, 4, 6, 7.

Tibbetts, 1,296,879, March 11, 1919, claims, 4, 5, 7, 8.

There is just a little step in there that I would like to be a little clearer about.

The Witness: Well, now, let me begin back—the—

The Court: I would still think you would be gathering all the heat pressure, and you would be crowding that into closer quarters, and I should think there would be an increasing temperature at that point.

The Witness: That is correct.

That is increasing temperature in the compressor, and a very great increase.

The Court: I am thinking now of the substance itself.

The Witness: Yes.

The Court: You have got the same amount of heat in a given quantity in that gas, and you compress that and compress it so much that it becomes a liquid. Then I would expect the liquid to be of considerably higher temperature than the gas was.

The Witness: It would if you could compress it to a liquid, but that would mean a very high pressure.

The Court: Well, but don't you, in this machine at all, finally get into a liquid form?

The Witness: We do, but we get it by the simple operation of cooling the—

The Court: Having compressed it considerably, then you do it by cooling.

The Witness: Yes. Otherwise we would have to compress to an enormous pressure, to compress to a liquid, would require compressing to an enormous pressure, and the developing of very high heat.

The Court: Just like steam finally comes back into water by the cooling of it?

The Witness: Yes.

The Court: That is this process here?

The Witness: That is this process here—by condensation.

The Court: All right, now I have got that. I drew the wrong conclusion, that you were compressing by your piston here.

The Witness: Into a liquid?

The Court: Into a liquid; and then, having made that very hot, you were cooling that liquid—and I did not think that your machine looked adapted to it. More like a radiator, you want to get air enough to the surface to cool it?

The Witness: Yes.

The Court: All right.

The Witness: On page 2, commencing with line 43, the connections of the condenser and compressor are described as the top coil, that is the condenser coil—"The top coil has an inlet end, figure 24, which is led down and connected with the compressor in such manner as to receive the compressed refrigerant from the cylinder of said compressor. The bottom coil has an outlet end, 25, which is led down through the top wall of the refrigerator and is connected by an expansion valve, 26."

The Court: Will you read that over, and point to it on your drawing?

The Witness: Yes, sir, I will commence at the first of the paragraph again. (Reading.)

"The top coil has an inlet end, 34, which is led down and connected to the compressor"—here it is (indicating), that is the head of the cylinder.

(Resumes reading): "Which is led down and connected to the compressor in such a manner as to receive the compressed refrigerant from the cylinder of said compressor."

The Court: It is still gas?

The Witness: Still gas. (Resumes reading.)

"The bottom coil has an outlet end, 25, which is led down through the top wall of the refrigerator," (that is the bottom convolution of this coil here, at 26)—"led down through the top wall of the refrigerator and is connected by an expansion valve, 26, of any suitable construction to the inlet end of the expansion coil. 27 indicates the outlet end of the expansion coil which is led up through the top wall of the refrigerator and is connected to the compressor in a familiar manner."

That is, 27 is the pipe that goes to the suction end or the intake end of the compressor. 24 is the pipe that leads from the head end or the discharge end of the compressor. So we have a closed circuit from the compressor through the condenser to the expansion valve, that is the throttle valve that lets more or less liquid pass through, through the refrigerating coil twelve, then back through the pipe, 27, to the intake end of the compressor and repeat.

The Court: Is there any exhaust valve, or anything of that kind, in the circulation system?

The Witness: No, sir.

The Court: No connection with the outer world at, all?

The Witness: No connection. It must be sealed.

The Court: Tight?

The Witness: Yes, and the tighter it is sealed, the better the householder will feel.

I think that is all of the description of the patent in suit.

The Court: Well, in the actual use of that gas, does it ever have to be replenished?

The Witness: Practically never, unless through some accident, some of it leaks out. If any of it leaks out, why then it has to be replaced.

The Court: So, there is no problem about the fumes of it, then? I was thinking about ammonia, you do get a snuff of that sometimes, don't you?

The Witness: Absolutely not—well, if you go into a refrigerating plant, that is, a large plant, you sometimes get a sniff of ammonia due to the packing, slight leaks of the packing, but they avoid that as much as possible; and in the household, the odor of the refrigerating gas would be very objectionable, sulphur dioxide, burning surphur matches—very extremely objectionable.

The Court: But it is supposed to be an absolutely hermetically sealed—

The Witness: Yes.

The Court: Tight?

The Witness: Yes.

Mr. Cooper: I would like to have marked for identification what I will prove a little later, as Exhibit 9, a sample of the plaintiff's ice box. I will ask the witness if he is familiar with the plaintiff's ice box, as exemplified in Exhibit 9?

The Court: By looking at it, can you see these coils?

Mr. Cooper: Yes, I thought I would take up that aspect of the matter immediately, with respect to the defendant's device, which I am going to ask the witness to compare with the Wolf patent.

By Mr. Cooper:

Now, will you take up the Exhibits 7 and 8, the defendant's ice box and describe the same with reference to the parts that you have described of the Wolf patent, and in doing this, if you have diagrammatic or other illustration of the parts, you may refer to that also.

The Court: Let us take our recess now.

(Whereupon a recess was taken until 2:00 o'clock P. M. of the same day, Monday, March 18, 1929.)

Frigidaire Witness Continues Testimony at Afternoon Session, Monday, March 18, 1929.

Afternoon Session, 2:00 o'clock p. m.
Court convened pursuant to recess.

Frank L. Sessions, a witness recalled for further direct examination, having been previously duly sworn, testified as follows:

Direct examination (Continued).

By Mr. Cooper:

(Last question read by reporter.)

A. Taking up the plaintiff's exhibit 7, which is a refrigerator of defendant's make, it will seem that the machinery is at the bottom of the box instead of being on top of the box as is shown in the Wolf patent. The machinery consists of a compressor which is of the same vertical type as used in the plaintiff's machines, but is not such as is used in the patents. In the patent there is a horizontal compressor shown; it makes no difference except the cylinders turn horizontally in the patent instead of vertically. An electric motor which is bolted to the compressor, and a fan upon the motor shaft. The compressor coil is mounted upon a base upon which are also mounted the motor and the compressor. Pipes lead from the compressor and the compressor coil up to the refrigerating coil; there are two pipes, one coming from the lower end of the compressor coil; that is the pipe that delivers the liquid to the refrigerating coil in the food box.

The Court: There?

The Witness: Yes. And there is this slightly larger pipe which is the return pipe from the refrigerating coil to the compressor.

The Court: That is the intake for the compressor.

The Witness: Yes, sir.

The Court: And this is the outlet from the compressor.

The Witness: The outlet from the compressor goes to the top of the condenser coil and then the action between the compressor coil and the refrigerator coil is from the bottom of the compressor coil.

The Court: Right there let me interrupt. Do you get any liquid except in the bottom of that condenser coil?

The Witness: In the SO2 machine, sulphur dioxide machine, the machine of plaintiff, the liquid begins to form in the upper convolutions of the coil. I have never tested one of those to determine just where the liquid does start to form.

The Court: It trickles along down on the bottom, I suppose?

The Witness: Yes, it is forced along by the gas that is—

The Court: In those you have observed when if ever would the coil become filled with the liquid?

The Witness: I should say two thirds to three quarters of the distance down from the top of the—

The Court: It gets full of liquid?

The Witness: Virtually full of liquid, yes, and that forms a reservoir.

The Court: At about 30 pounds pressure, did you say?

The Witness: No, about 65, I believe, on the SO2, this pressure runs a little higher.

The Court: I notice what looks like solder there; what does that mean, that it sprung a leak?

The Witness: No, that is where we have been doing testing of the temperatur, we have that soldered on.

Mr. Cooper: Soldered on the outside of the coil?

The Witness: Yes, soldered on the outside of the coil.

The Court: But not to patch up any hole in it.

The Witness: No sir, not a thing.

The refrigerating element is enclosed in a brine tank, and consequently the coil cannot be seen in plaintiff's exhibit 7, so I have here a duplicate of the refrigerating coil and brine tank in which the coil has been cut open to expose the coils and show their connections.

The Court: Show me where that connects—that is the pipe, the outlet for the compression coil and the intake for the refrigerating coil, isn't it?

The Witness: Yes sir, it connects right here, goes through this—this is a reducer or expansion valve.

The Court: It comes in here?

The Witness: Yes sir.

The Court: And what is that over there?

The Witness: That is a coupling.

The Court. How does it fasten on there?

The Witness: Well, the other end of the—

The Court: The last I saw of it, it comes up in a copper pipe.

The Witness: Yes, but there is another member that meets this coupling and forms a sealed joint there.

The Court: All right. Now I see. What is the object of that?

The Witness: Well, that seems to have been some kind of a strainer or filter, I don't know what the purpose is unless it is to filter the—

The Court: That is liquid that goes through there?

The Witness: Yes sir.

The Court: What temperature.

The Witness: At about the temperature of the room, hotter than the temperature of the room.

The Court: All right. In liquid form?

The Witness: Yes. As soon as it goes into this compartment here it probably is cooled down.

The Court: By pressure from below?

The Witness: Yes.

The Court: No suction here.

The Witness: By pressure from below, yes sir. The suction on the other end of this expansion or refrigerating coil is what forces the liquid to evaporate; there is a partial vacuum maintained in the compressor.

The Court: Then to that extent there is suction, isn't there?

The Witness: Yes sir.

The Court: There is always a pressure too.

The Witness: There is a pressure on one side and a suction on the other, and the gas expanding through this expansion valve which permits the liquid to pass into the partial vaccum in the refrigerating coil abstracts the heat from the brine and cools the—

The Court: What is this here?

The Witness: That is merely a container for the ice trays, which has to be sealed.

The Court: The ice they use to put in the glasses?

The Witness: Yes sir; it is that metal—that drum you called my attention to is simply to keep the brine in and permit the ice trays to be almost completely surrounded by the cold brine.

The Court: Is there brine in here?

The Witness: Yes, brine or some low freezing point liquid. In this particular machine, plaintiff's exhibit 7, the tank had become corroded and leaked, and we soldered it with a low melting point solder, and put in alcohol, and in shipping the model up here some of the alcohol spilled out and that is what you smell around the place.

The Court. What comes in contact with these pipes there?

The Witness: Just the brine or whatever liquid agent is used there for absorbing the heat.

The Court: And that takes the heat out of the brine and the brine, in turn, takes the heat out of the food box?

The Witness: Yes, sir.

The Court. Where does it go into the spray or steam or into the vapor again?

The Witness: Where the liquid becomes a gas?

The Court: Yes.

The Witness: Right at the opening of this expansion valve the liquid passing

(Continued on Page 17)

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Action of the Expansion Valve Explained

(Continued from Page 16)

through the expansion valve changes into a gas.

The Court: How big is the opening in the pipes in which the expansion valve—

The Witness: I have a cross section of it right here, your Honor, this shows one opening and this the other.

The Court: Which is the entrance end?

The Witness. This end here.

The Court: Here is where the liquid comes?

The Witness: Yes, the liquid comes in there through an opening in this pipe connection.

The Court: How large is the opening there?

The Witness: It is about—it is an opening of 3-8 of an inch or 5-16 pipe, I think there are—

The Court: It is not contracted at all at the end, is it?

The Witness: No sir.

The Court: But a hole right through the pipe?

The Witness: Yes, sir.

The Court: About half an inch—

The Witness: No, about a quarter inch, it expands and comes into the larger pipe here through this needle valve.

The Court: Is this the expansion valve here?

The Witness: Yes, this is the expansion valve, that thing you are asking about, to filter.

The Court: The strainer. And here it goes into that.

The Witness: Yes sir, through the needle valve, and it goes down around through the hole here into this—

The Court: That is all open, isn't it?

The Witness: Well, this—the liquid comes in here as it expands—

The Court: Immediately into gas?

The Witness: Into gas, and escapes as gas into this coil of pipe.

The Court: Well then, this is all gas in here;

The Witness: Yes, sir.

The Court: And by the expansion it becomes cold in proportion to the normal temperature.

The Witness: Yes, the temperature is very much reduced away down below the freezing point.

The Court: Because of the expansion.

The Witness: Yes.

The Court: It is a redistribution of the heat again.

The Witness: Yes.

The Court: Just the reverse of the other.

Q. On the chart have you carried over the figures of reference from the Wolf patent in suit, that is, do the figures of reference on this correspond to the figures of reference in the Wolf patent?

A. They do. Where there are parts that are not identified by the figures of reference in the Wolf patent they are named on the large chart.

Q. So that one, by following this chart of yours, can identify the various parts in the Wolf patent specified and in the claim?

A. Yes, sir.

Q. Now about the condensing pipe in plaintiff's exhibit No. 7, that is defendant's apparatus, calling your attention to the tube of the condenser, what is the substance of which that is made?

A. Copper.

Q. Of what diameter?

A. 3/8-inch outside diameter.

Mr. Cooper: I will offer in evidence this large chart.

(The chart referred to was thereupon marked "Plaintiff's exhibit 10.")

The Court: How thick is that copper again, you say? How thick are the walls?

The Witness: In practical figures it is about 1/32 of an inch. It may be a little more than that, 35/1000ths.

The Court: What is that 3/8 of an inch in the patent that he tells about?

The Witness: That is the outside diameter of the copper tube.

By Mr. Cooper:

Q. And just while we are on that question about the size of pipe, in this plaintiff's exhibit for identification number 9, the pipe in the condenser?

A. The condenser coils are 3/8 inch pipe that has been flattened in one plane in the plane of convolutions.

Q. Now, will you turn your attention to the other patent in suit, the Kramer patent, and explain very briefly so much of its improvement or disclosure as is described on page 3, lines 85 to 111, which I understand to be the subject of the six claims in issue of that Kramer patent?

Advantages of the construction described in the Kramer Patent.

A. The construction of the parts of the Kramer patent to which you have drawn my attention is to provide the support at the bottom of the refrigerator box and mount the motor, compressor and condenser all on a common base, which may be slid in upon the support and slid out in order that the parts may be inspected or handled in case such becomes necessary. It is not only advantageous after the refrigerator is installed in a house, but is advantageous in the manufacture, in the steps of assembling and testing of the plant where they are manufactured. In this patent there is a refrigerator box having a compartment at the bottom of the box and a support for the motor, condenser and compressor, 78. This support is arranged to slide on slides 79 that are provided at the bottom of the box. The pipes that lead to the condenser and compressor may be uncoupled, and the entire unit may be slid out from the box as I have described, or, in the case of the defendant's machine, as shown in plaintiff's exhibit 7, it is not unnecessary to uncouple the pipes—

Q. I think you said, "It is not unnecessary." You meant it was not necessary?

A. It is not necessary to uncouple the pipes in order to partially remove the machinery, as the pipes are small and flexible and of sufficient length to permit the machinery to be drawn out far enough to effect certain repairs and inspections.

Q. That same could be done without stopping the operation, could it?

A. Yes, without stopping the operation and without discharging the system of its refrigerant.

Mr. Frye: Mr. Reporter, will you please read that last preceding answer?

(Record read by the reporter.)

Q. Now, in this defendant's exhibit 7, the opening through which this withdrawal of the machinery is accomplished is in the front of the apparatus?

A. Yes, it may be wtihdrawn either from the front or the back. There is a lattice door for covering the front, but nothing covering the back.

Q. Now, with respect to plaintiff's exhibit 9, which you may assume is plaintiff's product, and plaintiff's exhibit 7, is the operation of those two mechanisms the same, or different?

A. It is the same.

Q. In your judgment, does it make any difference whether sulphur dioxide or methyl chloride is used as the refrigerating medium?

A. Not in the principles of operation. It may make a little difference in the pressures and diameters that have to be maintained, but no difference in the operations of the devices.

Mr. Cooper: That is all, I think.

Cross Examination

By Mr. Frye:

Q. Mr. Sessions, are you a mechanical expert or a patent expert in this case,—if you understand the differences in terms?

A. Well, I don't exactly understand what yau may have in mind. I am a mechanical engineer.

Q. Are you to be understood in this case as interpreting the patent, or interpreting refrigeration generally as shown in the two machines?

A. I do not understand that I am to interpret the patent.

Q. You do not understand it?

A. No. I point out the things that are in the patent and are in the machine. I place no construction upon the claims.

Q. You are not to be understood in this case, then, as interpreting the patent in the usual sense of a patent expert, is that correct?

A. I think I am to be understood as here to assist the Court to understand the patent.

Q. As distinguished from the claims of the patent?

A. Yes, to understand the construction of the patented structure.

Q. I am a little confused myself, Mr. Session. I happen to know that you have often served as patent expert and fully understand what is meant by the term "Patent expert." Now are you a patent expert in this case?

Mr. Cooper: I think I will object to that, if your Honor please. I have put Mr. Session on and I asked him certain questions and I don't think he has any understanding one way or the other about the significance, in any legal sense, to be drawn from this question. I don't like to be captious about my objections, but it seems to me that the only function of a witness is to answer questions up to the point where there is an objection and ruling by the Court.

I may say that I disclaim all intention at any time of having asked Mr. Sessions, or intending to ask him, to construe the claims if that is what the point of the question is; I did not want anything more than an explanation.

Mr. Frye: Well, could you answer me this off the record: Will you have another witness that will go into claims, or is Mr. Sessions,—

Mr. Cooper: No, no, I suppose I will have to be the expert on claims.

Mr. Frye: Well, understanding as I think I do, from what has been said by the witness and counsel, Mr. Sessions is to help the Court understand what the patents are about, and how they are to be applied on the defendant's machines. That is what we understand is a patent expert's position and under such, why, we will proceed.

By Mr. Frye: (Resumed)

Q. Have you ever, as a mechanical engineer, designed a refrigerating machine?

A. No, I have never completely designed one. I have assisted somewhat in aiding another man to design one.

Q. As a patent attorney or as an engineer?

A. As an engineer.

Q. How long ago was that, Mr. Sessions?

A. Several years ago. I don't recall just.

Q. Well, in recent years, say in the last five years, what has been your experience in connection with refrigeration as an art?

A. I have had no experience other than the fact that I have had in my house a Frigidaire machine for four years. I made a careful investigation of different types of machines at the time I bought this equipment and during the last year I have had to study the subject closely in connection with this case.

Q. Ahead of your entrance into this case, your experience was limited, was it, to helping a man design and the usual work that a customer would have in running a Frigidaire machine; is that it?

A. My actual contact with the problems involved, yes. My actual observation and contact with the industry has been considerable during my entire experience as an engineer.

Q. Well, what else has been the contact with it outside of those two instances, Mr. Sessions?

A. Visiting refrigerating plants, and reading technical literature upon refrigeration.

Q. Now, you gave a rather lengthy discussion in your direct examination about the theory of refrigeration. Is there any difference in theory between a hundred ton ice machine and a one-ton ice machine?

A. No.

Q. Is there any difference between the

(Continued on Page 18)

ORIGINAL COMPLAINT PUBLISHED IN FIRST ISSUE OF THE NEWS

The complete transcript of the original bill of complaint in which the Delco Light Company charged the General Necessities Corporation with infringement of seven patents was published in full in the "Special Waldenwoods Edition," the first issue of Electric Refrigeration News which was distributed Friday morning, September 11, 1926, at a meeting of the Electric Refrigeration Council being held at Waldenwoods, near Hartland, Mich.

Only 500 copies of this preliminary edition were printed. The new publication was sprung as a surprise at the meeting which was attended by officers and departmental executives of several manufacturing companies including Copeland, Kelvinator, Servel, General Electric and Nizer (later consolidated with Kelvinator). Observers from the Westinghouse Company were also present. The Frigidaire Corporation, which, up to that time, had been a member of the Council, was not represented at the meeting.

Tentative plans had been made for regular publication of Electric Refrigeration News subject to the reception accorded it at this representative gathering of electric refrigeration men.

The test indicated that the paper would be well received and, immediately after the meeting, some changes were made in the text matter and an edition of 10,000 copies of Vol. 1, No. 1 was distributed. The changes mentioned included the omission of the patent suit transcript although the news story and list of patents remained.

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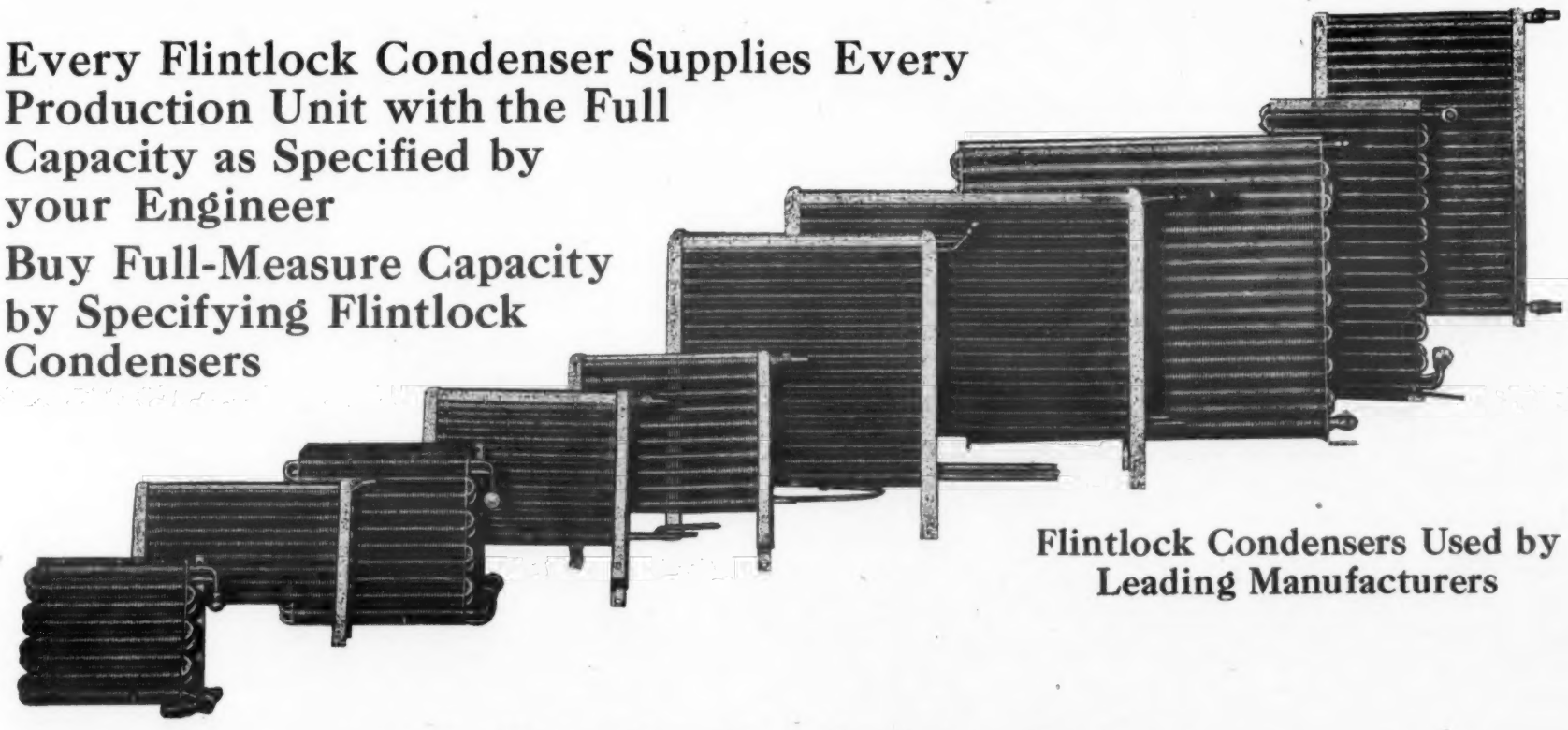

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Isometric Diagram of the Absopure Refrigerator

(Continued from Page 17)

one-ton ice machine and a 100 pound ice machine?

A. The machines are vastly different, yes.

Q. We are talking of theory now, Mr. Sessions.

A. You did not say "Theory."

Q. Is the theory precisely the same?

A. Yes.

Q. In order to make a machine for building—for making ice of a certain amount during the day—now, we will take for a fair example, say one-ton: Would you, as an engineer, consider you had any greater problems than if you were given the problem of solving it for say a hundred pounds a day?

A. I think the problems would be radically different.

Q. In what?

A. In that the various economies on small machines are inevitably less than large machines, and the proportions of the parts involved would have to be determined by careful experimentation.

Q. Would you think there would be anything other than experimentation to find out what sizes, for example, of pipes were needed in the hundred pounds, as compared to a one-ton refrigerator? Is there any way that a mechanical engineer can figure these things?

Mr. Cooper: You mean as of this date, or as of what time?

Mr. Frye: I am asking him as a mechanical engineer how he would do it, or if there is any way it can be done. I don't care when?

A. I know of no way in which it can be done excepting by consulting empirical data established by the experience of others, or by one's own experience.

Q. Is there any such data available at the present time?

A. Very little that I have been able to find. The chief data that I have been able to find on this small unit is found in the Wolf patent.

Q. Did you examine the patents that were set up in the answer of this suit?

A. Yes, sir.

Q. How about the patents that are of general knowledge in this art?

Mr. Cooper: I think, if your Honor please, I will object as being outside of the direct and think a little untimely in the order of proof, any questions relating to the prior art at this time.

The Court: The objection is over-ruled.

Mr. Frye: The witness has volunteered a statement that practically all he was able to find of information was in the Wolf patent.

Mr. Cooper: Oh, on some particular points.

Mr. Frye: We do not believe that that was intended to be stated. He may have intended, but I don't think it was intended to be stated.

The Witness: You asked as to the data available for dimensions of machine.

Q. For making a different sized machine, as between a one ton and a 100 pound machine. Now, with all the usual knowledge that mechanical engineers have, I would think there would be a way for you to figure what size compressor you would need, what size condenser you would need, what size pipes you would need. Now, is that or is that not the fact in this art?

A. One may figure and arrive at certain results that may be entirely wrong for best results when one builds his machine, if he starts from no experience, if he starts from nothing; if he takes the experience of others, if he can find out, and take advantage of it, he may figure closer.

Q. Well, do you still want to stick to your answer that on a question of change of dimensions between a one ton and a 100 pound machine, that the only data available to you is in the Wolf Patent?

A. As to the—

Q. Change in sizes as to parts?

A. Oh, of course, it goes without saying that one would know that the power required for a one-ton machine would be vastly different from one of the smaller types—what did you say?

Q. 100 pounds.

A. A 100 pound machine.

The Court: That means 100 pounds in 24 hours?

Mr. Frye: That is the way they figure, yes.

The Witness: The motor and the compressor would have to be vastly smaller, but how to connect them up in a household refrigerator involves other problems besides the mere choosing of a motor and a compressor; it involves the condensor and the evaporator and a lot of other details.

Q. You don't think this could be computed, is that it?

A. No, not without using the data of experience of others. It could not be computed from theory and be within gunshot of correct.

Q. At least, you have never done so, is that the fact?

A. That is correct.

Q. Now, returning to the theory: As I understand you, we will take a liquid which is of a volatile nature and pass through an expansion valve into a part where it will be reduced in pressure and still will expand, going into a gas during such expansion. Is that what is known as the low side of a refrigerator?

A. Yes, the low side is after the gas has expanded.

Q. Well, isn't it all the part between the expansion valve and the entrance to the compressor?

A. Yes.

Q. That is what we call the low side?

A. Yes.

Q. Now, about what are the pressures on that side in the refrigerators before you?

A. About five pounds below the atmosphere.

The Court: And what is the atmosphere.

The Witness: 15 pounds.

The Court: And this would be about 10, then?

Mr. Frye: About 10 pounds per square inch.

The Witness: Well, five pounds—let me see: Yes, five pounds below atmosphere; ten pounds absolute.

Q. Now, and what is termed the high side, is included there the compressor and the condenser?

A. Yes.

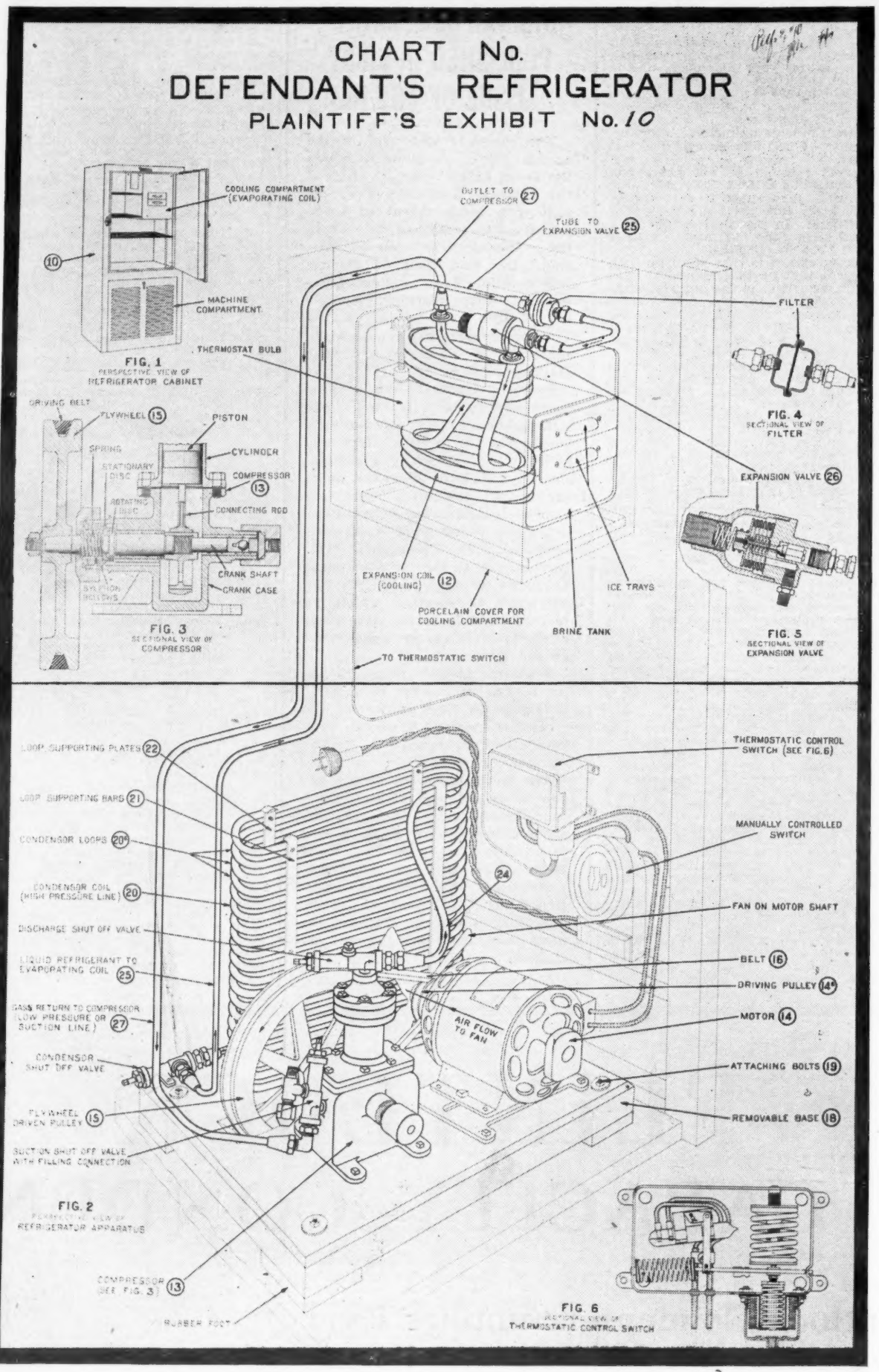
Q. And in the two refrigerators before you, does either of them use a collector or tank in between the condenser and the expansion valve?

A. Oh, in the plaintiff's there is a receiver; in the defendant's the lower portion of the condenser is the only receiver there is.

Q. That acts as both receiver and condenser, is that the fact?

A. Yes, sir.

Q. Does the pressure remain the same throughout the entire high side of the unit?



A. Yes, so far as I know.

Q. And the only difference that takes place is that at first the gas is compressed, that is, heat due both to the mechanical energy put in by the compressor and the energy that it still had when expanded Now, when we have both pressure and reduction in temperature, by cooling we liquefy the compressed gas, is that the theory?

A. What kind of a theory?

Q. Is that the theory, I say, of refrigeration? If you don't understand me, kindly say so.

A. I would like to hear the question again.

Q. I will put it in a way that may be clearer. You have explained to us, and to his Honor, at great length, that we take an expanded gas spread out, we will say, over an area of three or four cubic feet and compress it down, we will say, to a cubic inch, yet it is still a gas, pressure alone you said will not make it a liquid unless you carry it so high it is dangerous, and then in addition to the pressure we need a reduction of the heat by cooling before it becomes a liquid, and that takes place in the condensing coil. Now I understand that to be your theory of refrigation, and if not please explain it?

A. That is the action that takes place in the parts of the cycle that you have described.

Q. And it is in both plaintiff's and defendant's, and also in every other refrigerating apparatus of the compression type, is it not?

A. Yes.

Q. Now is there anything that plaintiff contributed to any of these things we have been talking about in that theoretical cycle, so far?

A. I think not.

Q. It was old and well known before the plaintiff entered the field?

A. Yes.

Q. Now let us go back, and as to these two patentees, was there anything new that they contributed to this cycle that you have been describing to his Honor?

A. Not in the heat cycle.

Q. Then what was it in your estimation that the patentee, Wolf, has given the world, if you can tell us in a few words?

Mr. Cooper: I will object to that, if your Honor please; it seems to me that is not for the witness to say; that is what ultimately the Court has to decide after the evidence is in. I have not called the witness on that point at all. Besides, if we go into the prior art at this time we do not have an orderly presentation of the case at all; the prior art is for the defendant to put in and for the plaintiff to rebut after it is in.

The Court: Well, it is cross examination, and that gives them a side range. I do not see that it will do any harm.

Mr. Frye: I should think, if I was in his Honor's place, that I would want to know not only what the patent says, but what is new about it, if anything.

Mr. Cooper: Well, that is for you to say, I think. However, the Court has ruled with you, and I do not want to discuss it with you.

Mr. Frye: The question is what, in the witness' opinion, the patentee has contributed that is worthy of a patent?

Mr. Cooper: I will object to that in that form, certainly that is not a proper subject of inquiry.

The Court: Leave off the last part of it.

Q. Well, all right.

The Court: Now go ahead.

Mr. Frye: Whatever we had before. I am not trying to get any particular claim, but the generic statement of what he thinks is the gist of the patent.

Mr. Cooper: I think they are apt to contradict what he elicite by that sort of cross examination.

Mr. Frye: Well. I understand he did say that on direct examination as to the Wolf patent, referred to, and I want to see if he still says the same thing.

Mr. Cooper: I only asked him for the disclosure of the Wolf patent.

Mr. Frye: I am asking him what is the patentable disclosure of the Wolf patent.

Mr. Cooper: And that is where you are binding yourself, in my judgment.

The Court: He may answer if he is prepared to. I don't know how much he has studied the prior art, but I am glad to get any help I can on either direct examination or cross examination.

The Witness: Wolf devised or discovered certain proportions and relations and parts, an arrangement of parts that made it possible to make a small household unit with an air cooled condenser. The provision of the air cooled condenser obviated the necessity of any water connections; the cost of water, and the cost of installation and the cost of upkeep, making it possible to provide machines that can be used in the country where there is no running water, and to provide machines in any building, or installation where it would be difficult or inadvisable to make water connections. The parts are combined in a very compact and efficient way, and enables the machine to be made automatic in its starting and stopping, with very simple mechanical or pressure-actuated devices.

Q. Are you through?

A. Yes.

Q. D oyou think that Wolf's addition to the art resides in the combination you have spoken of, or one element of the combination?

A. In the combination.

Q. And that combination consists of, I believe you said, the compressor, the condenser and the cooling coil, plus automatic connections, etc. Did I omit something?

A. What was the third element you included?

Q. The cooling coil.

A. The evaporator.

Q. Well, that is what I mean by a cooling coil, the evaporator or refrigerator coil, I believe you called it on direct examination. Now, is that the combination?

Mr. Cooper: I think the combination is stated in the claims and in the disclosure, I think we have got to assume that for the purpose of your cross examination.

Q. Well, answer the question.

A. No, those are elements you have recited, certain elements in his invention.

Q. And you say the invention does not reside in any of those elements, but in a combination of all those elements, is that the idea?

A. In the combinations that are recited in the claims.

Q. Do you happen to know, as a mechanical engineer, whether condensers had been used ahead of the Wolf patent filing date, whether—

A. Whether condensers had been used?

Q. Yes.

A. Certainly they had been used for years.

Q. In the refrigerating industry?

A. Yes.

Q. How about compressors?

A. They have been used.

Q. And how about refrigerator coils?

A. They have been used.

Q. How about automatic connections?

A. They have been used.

Q. Then, it is your understanding that the elements themselves are old, but the combinations new, is that it?

Mr. Cooper: I object to that.

The Court: He may answer.

The Witness: It is my understanding that the combinations that are defined in the claims make the invention.

Q. You understand that it is the defendant's contention, do you not, as in the answer, that there is no invention. We understand, I think, pretty clearly, and we would like you, as an expert mechanic, or patent expert, whichever you are functioning as, at the present time, to tell the Court what is the subject matter of the claims he is supposed to construe.

Mr. Cooper: May I ask counsel to state what part of that question he regards as the question.

Mr. Frye: I would like to have him state what the Court is to understand is the claim or subject matter, or whatever he calls it, of the claims in suit?

A. The claims speak for themselves; I will read them if you wish.

Q. They have been read, and the question is whether you had any statement, as an expert, which you wanted to put in the record as to what they mean.

Mr. Cooper: I don't think the form of the question makes it competent. The witness testified as to that, he has answered the question. I object to the question as improper in form.

The Court: Objection over-ruled.

Mr. Frye: To make certain that the witness understands what we are attempting to have him answer, he has stated categorically that each element of the so-called combination was old at the time the patentee filed his application, speaking of the Wolf patent. I will ask him to state what he thinks, under those conditions, is the subject matter of the claims in issue here; is it the general combination or what is it that he wants to have the Court find in the defendant's structure to be an infringement.

The Witness: I may have been misled by your question, the volume of the question. The atmospherical cooled condenser in a refrigerating apparatus is new with Wolf, that is, an atmospherically cooled condenser of the type that Wolf uses.

Q. Then that is an element, isn't it, of the combination?

A. Yes

Q. Rather than the entire combination?

A. That is an element, but it is the combination that makes the invention, makes up his contribution.

Q. Have you had experience in the automobile art? I think you said on direct examination that you had.

A. I did not so state, but I am willing to state now that I have had certain experience in it.

Q. Do you know for a fact that water cooled condensers and air cooled condensers were both used in the automobile industry prior to 1913?

A. Condensers. With steam machines, you mean?

Q. Well, in various ways. Take, for example, in the radiator, the steam forms in the water circuit and it will condense it back to water, won't it?

A. Not always. It tends to, but not always, it is not for that purpose. The primary purpose is to cool the water.

Q. And if the water is in there as steam it will cool it into liquid, will not it?

A. If it remains there as steam, but I have very seldom seen it do it.

Q. Are you familiar with the old steam car, the Stanley or Doble, or any of those?

A. Yes.

Q. Did they have a condenser that took steam, after it had been used and reconverted it into water?

A. Yes, but that is not the ordinary radiator of the present day automobile.

Q. What type of condenser was used, if you know, was it a coil of pipe? You say it was not the usual radiator. What was the type of condenser used, for that?

A. I don't know the exact construction, there has been a number of different types, some that were frames with pipes running through them.

Q. Do you know whether or not it was a coiled pipe formed the condenser in these steam cars?

A. I don't know of any such construction, I have seen straight pipes used, to a frame.

Q. Were they copper pipes?

A. Yes.

Q. Were they usually about 3-8 of an inch in diameter?

A. I don't know what the diameter was.

Q. Well, they were not over half an inch in diameter, were they?

A. I think not.

Q. And that was away prior to 1913?

A. Yes.

Q. Are you familiar with stills, not in the sense that people have been in the habit of using it today, but in the laboratory sense?

A. I have seen them, yes.

Q. Have you ever seen any made of coiled copper tubing?

A. Yes.

Q. About 3-8 of an inch in diameter?

A. Yes.

Q. Certainly below a half inch in diameter; that is, they may vary in diameter, but not over half an inch?

A. Depending on the size of the still.

Q.: And were they air cooled in some instances and water cooled in others? And I am speaking now as a general practice.

A.: Yes.

Q.: And do you know as an engineer that they were used away prior to 1913?

A.: Yes.

Q.: As regards the combination that you have referred to in the Wolf patent in suit, I would desire you to glance at the Lowe patent issued April 2, 1867, Number 63413, and ask you if you have ever seen that patent before?

Mr. Cooper: I think I would like to press my objection, if your Honor please; we are going too specifically into the prior art, and the gentleman is going beyond the direct. He insists on opening up the prior art and apparently not having gotten the answers he wants he now begins to itemize the prior art. I did not call him for that purpose, it is beyond the scope of the direct, it is out of order in the case. The defendant has to prove its case, it cannot accuse at this time that there ever was such a patent, and it does not seem to me it is timely at all, or proper examination. All that is incumbent

(Continued on Page 19)

Gas is Atmospherically Cooled in the Condenser

(Continued from Page 18)

upon the plaintiff at this time is to explain its own patent, explain the defendant's device and when that is done I do not see how the matter can be put forward in an orderly way by having a general opening up of the prior art at this time, and I think my objection is a good one.

The Court: It might be more orderly to do it that way, but if counsel wants to ask the questions at this time I will let him do it.

Mr. Cooper: I still stand on the objection that it is outside of the direct examination and counsel has got to be bound by his answers.

The Court: We will take the answer.

Q.: Are you familiar with the patent?

A.: I do not recall it.

Q.: Will you look at it and see whether you find in it the four elements you have specified as a combination of the Wolf patent?

Mr. Cooper: In the first place, the gentleman has not specified it that way, and in the second place, and I think this objection is a good one, this item I am informed is not set up in the answer, therefore, it is not admissible in the case.

Mr. Frye: Mr. Cooper does not mean that, I am sure, that it is not admissible, because it is not set up in the answer.

Mr. Cooper: Well, I hate to have you contradict me, but I will stand on my statement.

Mr. Frye: We have at least half a dozen decisions on that, saying you can use to interpret any prior publication, and this patent is certainly one of that type. We do not say it is anticipatory, it is explanatory.

The Court: The objection is overruled.

(Question read by the reporter.)

The Witness: Which claim?

Q.: As I understand you have told us what was the gist of the Wolf patent as specified in the claim Now, do you want to amend your answers that the combination is the good part of the Wolf patent and not any particular element thereof?

A.: Certainly the combinations are the good part of the patent.

Q.: Now, see if you can find in that particular one of the elements that enter into such a combination.

Mr. Cooper: have you a copy of that that I can see. It is a matter of complete surprise to me.

Mr. Frye: It happens to be the one on top here. I don't know that we have any others here or not.

The Witness: Have you any better copy than this?

Q.: That is the only copy of it I have at the moment. We have others at the hotel.

A.: This type is very small, and last week I had an operation on one of my eyes—

The Court: I will not require it to be read by you if you find it troublesome for your eyes, at least not under this light.

Q.: Do you find a reference to sulfurous acid in that patent as a refrigerant?

Mr. Cooper: I think I shall object to that, the witness has pleaded the condition of his eyes, and I don't think he should be required.

Mr. Frye: Well, if he can read it we will be glad—

The Court: Why not read the part you want.

Mr. Frye: I wanted it checked, that is all, I happen to have only the one copy here.

The Court: Well, read to him just the point you refer to, it is in there or is not, and you can read it to him and follow it up with any question you want about it.

Q.: "Sulfurous acid, nitrous acid, and some hydro-carbon gases are examples of bodies which ordinarily exist in the gaseous state, and which by mechanical compression are converted into a liquid state, and it is such that I employ in my process."

Mr. Cooper: Let counsel quote what he wants to on the record, and I can follow with another copy and see whether he reads it. They have handed me a copy, and I find these words in there.

Mr. Frye: Now, I understand the witness has stated the combination of the Wolf patent consists of the condenser, compressor, refrigerating coil, and the connections there between all of which form a closed circuit for a refrigerant such as SO2 or sulphuric acid. The question we would like him to answer in connection with this particular instrument is whether he finds a pump or compressor which is marked and shown with a numeral B.

Mr. Cooper: I object to that, he has got to read the text to find that out, and he has already pleaded the condition of his eyes, and I say it is a matter of surprise with us, and it seems to me under those circumstances counsel ought not to press his question; if the patent goes into evidence it will speak for itself.

Mr. Frye: Under the circumstances we will offer this particular patent as an exhibit at this time.

Mr. Cooper: I will object to any offer of evidence of that kind. I suppose it can be considered as marked for identification, and if at some time there is proof of the patent it will go in.

The Court: I will admit it

(Paper marked "Exhibit 11.")

Mr. Cooper: I understand it is received at this time not as anticipatory, but simply to explain the art?

The Court: The prior art, yes.

Mr. Frye: That is true, your Honor.

Q.: Do you understand the claims of the Wolf patent in suit?

Mr. Cooper: I will object to that, I have not asked him and I don't think it is competent to ask an expert; that is a matter that the Court has to determine; the interpretation of that, and whether the witness understands or not is not a material matter.

The Court: Objection overruled.

The Witness: I have my own understanding of them.

Q.: You certainly would not attempt to explain or to say to his Honor without understanding them, is that the thought?

A.: Yes.

Mr. Cooper: I have not asked him to explain them, he has not explained them, and I don't know what the gibe is about.

Mr. Frye: I cannot understand how a witness, particularly the only expert that you say is going to interpret the patents in suit, can explain to his Honor, what the suit is about without explaining what the claims in issue are about.

Mr. Cooper: Well, now, I think that jibe is directed at me.

Mr. Frye: Now, I would like very much to know why this particular witness was not asked that question. He did not answer it claim by claim, but why was it he asked that question?

The Court: I don't think there is any question pending to the witness, is there, right now?

Mr. Frye: Yes, we have asked him does he understand it, and then he says, "Yes."

The Court: What is the next question?

Mr. Frye: Well, the next question, I was going to take is there first to these claims, and have him explain what they really mean, just by way of example.

Mr. Cooper: Well, I think that is for the Court.

The Court: I will let you do it.

Mr. Cooper: Of course, here again, I am claiming that it is beyond the scope of the direct and counsel is binding himself by the answers he gives.

Mr. Frye: We are contending, your Honor, that he was asked that question in effect if not in so many words, that he cannot interpret the patent in suit without knowing what the claims in issue are about.

Mr. Cooper: If that question was asked I have broken a rule that I think I have not broken in ten years, asking a witness about the meaning of claims. It has been universally overruled, any such question as that, in my home jurisdiction, and I have never tried to ask the question, I think, in ten years.

Q. Have you the Wolf patent before you?

A.: Yes.

Q.: Well, now, I think claim 10 is the first of these claims in suit. Will you read into the record, clause by clause, so to speak, this particular claim so that we can be certain his Honor understands what the gist of it is?

Mr. Cooper: I will object to that. The claim speaks for itself. It is no use to lumber up the record with the claim in toto, or clause by clause, and I say the claim cannot be read now as it was printed in the text of the patent, but must be read with the disclaimer. If counsel wants it on the record at this point, I will read it with the disclaimer on the record.

Mr. Frye: When we say "Clause by clause," we would like him to explain what each clause refers to. I don't care whether he reads it as an entirety or how; and of course, we mean plus the disclaimer. We want the claim interpreted as it is before the Court.

The Court: The objection is over-ruled.

A. Claim 10 as originally appearing in the patent calls for a refrigerating apparatus comprising in combination,—and I would now read the elements as they appear in the claim, the first element being means to compress a refrigerating gas to a pressure the corresponding boiling point of which is above the temperature of the atmosphere.

The second element is an atmospherically cooled condenser for condensing compressed gas.

The third element is an expansion chamber into which the liquid is expanded and the condition of the combination is recited in the last clause, "Said parts being connected to form a closed circuit for the refrigerant."

Now, the disclaimer reads as to claim 10, "There is disclaimed all refrigerating apparatus which does not have an atmospherically cooled condenser for condensing the compressed gas, composed of a considerable length of tubing made of copper about 3/8 inch in diameter and having a comparatively thin wall.

The disclaimer limits the second element of atmospherically cooled condenser as it appeared in the claim originaly granted.

A. Now, the refrigerating apparatus that is referred to is of the household type, for domestic purposes, a relatively small apparatus that can be used in general household or small installations.

Q. Does that say that in the claim, Mr. Witness?

Mr. Cooper: Now wait a minute. You asked him for his understanding of the claim.

Mr. Frye: All right, exactly.

Mr. Cooper: All right, let him state it. Don't interrupt him.

Q. Is that in the claim.

The Court: I will let the witness complete his answer, I think, first, then I will let you ask that question you had in mind.

Mr. Frye: I don't want him to wander that is all; if it is possible I want him to save a little time on it. Go ahead and complete your answer.

A. I am trying to answer your question to the best of my ability.

Q. Proceed. I am sorry I interrupted you.

A. I did not understand that you wished merely to separate the claim into its elements without any explanation. This claim is for a refrigerating apparatus, and the refrigerating apparatus that is the subject matter of this patent is stated in the specification on page 1 commencing with line 18. The invention is primarily intended to be used for domestic purposes.

I take it that the refrigerating apparatus which is recited in claim 10 is such a refrigerating apparatus.

"Means to compress a refrigerating gas to a pressure, the corresponding boiling point of which is above the temperature of the atmosphere, is compressor 13, which is mounted on top of the machine."

In this regard, the specification on page 1, line 14, calls attention to the fact that the invention relates to refrigeration, and particularly to processes and apparatus involving compression of the refrigerant as distinguished from absorption systems, by the means to compress the refrigerating gas, I take it to be a mechanical compressor; and that it must compress the gas to a pressure, the temperature of which it is above the atmosphere in order that there may be a difference in temperature between the atmosphere and the compressed gas, in order that efficient, rapid cooling of the compressed gas may be affected in the condenser. The atmospherically cooled condenser for condensing compressed gas, which, by the disclaimer, must be composed of a considerable length of tubing made of copper of about 3/8 inch in diameter, is the condenser which is shown mounted on top of the refrigerator, the part being marked 20. This consists of a coil of copper tubing of about 3/8 inch diameter, and it is exposed to the air throughout its length between the compressor and the refrigerating coil, and it is made of such length as will be required to properly cool and liquefy the refrigerant. The parts are connected to form a closed circuit, the compressor taking the expanded gas from the refrigerating coil, compressing it to the proper pressure to give it the desired temperature, discharging it into the condenser, the atmospherically cooled condenser in which the gas is liquefied, and from which it is expanded into the chamber which consists of the coil of pipe 12 within the food box or refrigerator proper.

Q. You have completed your answer?

A. Yes.

Q. Now, as a mechanical engineer, would you say that that claim recites an operative combination of parts for refrigeration purposes?

A. Yes, sir.

Q. Do you think an expansion valve is necessary in this closed circuit that you have told his Honor about, in theoretical refrigeration?

A. It is in this refrigeration, yes.

Q. Will the device work without an expansion valve?

A. It would have some refrigerating or cooling effect, but it would not be anywhere near as effective or efficient as it is with the expansion valve.

Q. Well, is it your understanding that the expansion valve must be imported into this claim, when it refers to a closed system?

A. No, but the expansion valve may be inferred from the clause in the claim which reads, "An expansion chamber into which the liquid is expanded, "in order that the liquid may be expanded, it must either come from a high pressure into a low pressure compartment, or the chamber into which it will be expanded must be very large and of low pressure.

Q. Now, take the first element of the combination. It reads, "Means to compress a refrigerating gas to a pressure the corresponding boiling point of which is above the temperature of the atmosphere." Corresponding boiling point of what, is meant there?

A. The refrigerant, with the refrigerating gas.

Q. Well now, does a gas have a boiling point?

A. No, but I think anyone reading it would know that it meant the liquid from which the gas was evolved.

Q. But now, where does it, compressing it to a pressure affect the boiling point there—if we are talking of liquids, you have explained very painstakingly that it does not become liquid during the means of compressing?

A. It does not, but the pressure that is attained compresses the gas to such a point that its temperature at that pressure, that is, its boiling point at that pressure, is above that of the atmosphere. That is the boiling point of the liquid into which the gas may be converted by cooling.

Q. Well, what does the claim say?

A. Pardon me just a moment: There is nothing I can see in this claim that is not perfectly understandable. I don't just understand your question, the reason for asking it, because it is perfectly understandable.

Q. I am glad to learn that. You are the first engineer that has given me that answer. Let us read that again: Means to compress refrigerating gas to a pressure,"— nothing but pressures and gas—"the corresponding boiling point of which." It might be the boiling point of the pressure or the boiling point of the gas, but there is no other antecedent.

Mr. Cooper: Wait a minute. I object to this form of questioning.

Mr. Frye: Well now, he said that that is very clear. He has not made it clear to me, and I doubt if he has to his Honor. I would like him to put on record exactly what it means, or what he thinks it means.

Mr. Cooper: I object to that. It has already been answered. Whether it is closer to counsel or not is a question for which the plaintiff in this case can take no responsibility whatever. He asked the witness a question as to his understanding and the witness has given his answer. There our responsibility ceases.

The Court: The objection is over-ruled.

A. Obviously, there can be no boiling point of pressure. Pressure is a force. I cannot conceive how anyone would be misled in reading the claim, as to whether the boiling point referred to the pressure or to the gas. It refers to the gas, naturally, and when a liquid is boiled and forms a gas, the liquid is said to boil, but it is at the same temperature as the gas. There is no difference between the gas and the liquid as to temperature, so that I cannot see how anyone, searching in this art, would be confused as to the matter of boiling gas. Gas may be heated, but I don't know how it can be boiled.

Q. Have you completed that answer? Do you think that claims refer to any particular refrigerant

A. Only as it is limited in the claim: A refrigerating gas that may be compressed to a pressure, the corresponding boiling point of which is about the temperature of the atmosphere.

Q. Do you know of any refrigerant that does not have these conditions?

A. No, I do not know of any.

Q. Then it is practically a broad statement, isn't it, of any refrigerant with any means to compress, is that true?

A. Any refrigerant that may be compressed as stated, and any means to compress, yes.

Q. Well, just a broad statement of means to compress, with any refrigerant?

A. Yes, that is my understanding; a refrigerant that will answer the purpose.

Q. Do you suppose ammonia would be a suitable refrigerant to fall under that claim?

A. Ammonia could be used under these definitions or limitations, but the pressure would have to be very high, as I explained to his Honor this morning.

Q. Well now, explain again whether it would fall under the clause of this particular claim.

A. Which clause, now?

Q. The only clause, as I understand it, that refers in any way to refrigerant is "Means to compress a refrigerating gas," etc.; that very first clause?

A. Oh, yes, I see no reason why it might not refer to that ammonia used,—might be used in this apparatus as defined in this claim.

Q. If it has the remainder of the elements in combination, it would infringe that claim; is that your idea of it?

A. Yes.

Q. Now, the next element, atmospherically cooled condenser, you have referred to as the one amended by disclaimer.

Now, take the third element, an expansion chamber into which the liquid is expanded; what do you understand "Chamber" to mean?

A. A closed compartment or vessel.

Q. Do you think a coil is a chamber?

A. Yes.

Q. Do you think the shape of the chamber is immaterial?

Now, the amendment to the second portion by disclaimer, refers to a particular diameter of copper tubing. Will you read the wording of that disclaimer again?

A. (Reading) "Hereby does disclaim from the scope of said claim 10 all refrigerating apparatus which does not have an atmospherically cooled condenser for condensing the compressed gas, composed of a considerable length of tubing made of copper of about 3/8 inch diameter and having a comparatively thin wall.

Q. What do you understand is meant by saying, "Has eliminated from the scope of the claim"?

Mr. Cooper: I will object to that, if your Honor please. That is calling for a construction of a legal document, that is, the disclaimer. I don't think the witness can

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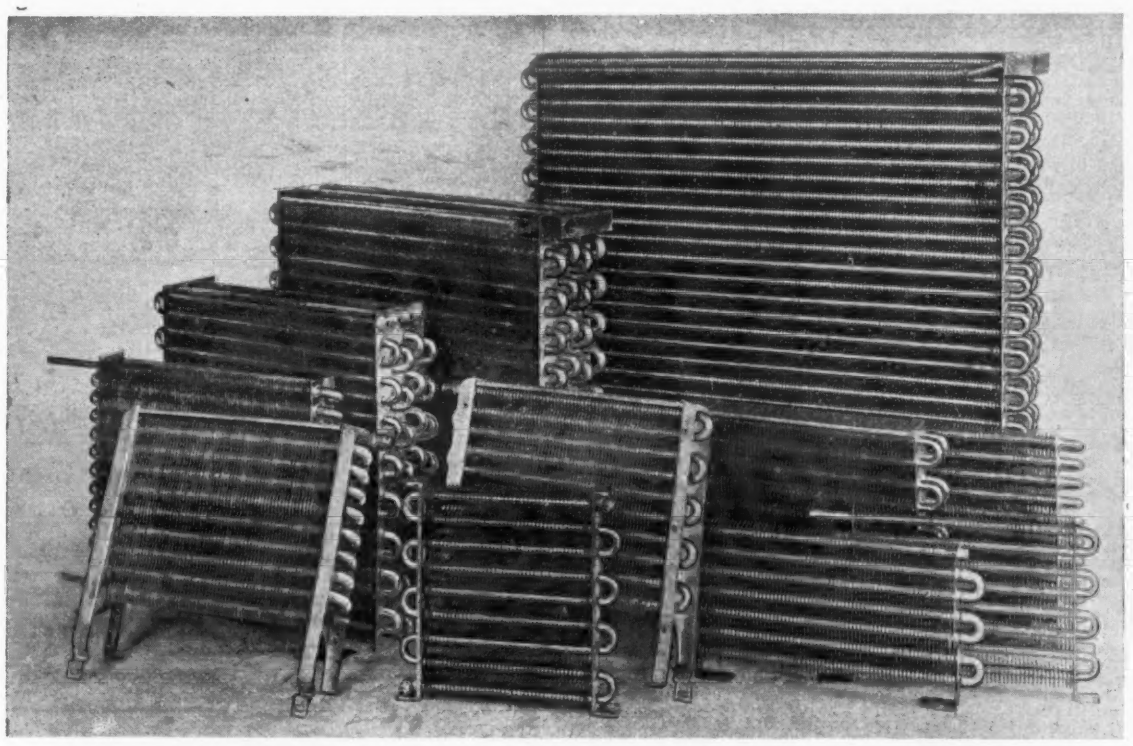

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be asked as to the effect of the words of the disclaimer.

Mr. Frye: No, we are asking him what he understands the words to mean, not what the effect is.

The Court: I will let him interpret the language,—finally I will have to do it. What did you say, Mr. Cooper?

Mr. Cooper: Well, my point is based on the way the question was asked. Will you read that question, Mr. Stenographer, please.

(Question read by the reporter.)

Mr. Cooper: Now, that does not go to any of the technical language either of the disclaimer or of the claim, that is, the technical in the sense of the scientific part of it, but it simply goes to the form of the disclaimer which is entirely beyond this witness' province.

The Court: The objection is over-ruled.

A. I assume that you meant by the word "Eliminated," the same as disclaim.

Q. I meant to quote from the disclaimer. Whatever word I used,—if I got one wrong, let's correct it right now.

A. You used the word "Eliminated," and it does not appear in the disclaimer.

Q. How does that read at the very start?

A. "Hereby does disclaim."

Q. "From the scope of this claim?"

A. Yes.

Q. Will you give us your understanding of what is meant by that phrase in the claim?

Mr. Cooper: Here again, we are beyond the direct, and I disclaim any responsibility for the witness' answer. Counsel is making his own; he certainly cannot bind the plaintiff by an understanding.

The Court: He may answer.

A. It is my understanding that the refrigerating apparatus that does not have an atmospherically cooled condenser for condensing compressed gas, composed of a considerable length of tubing made up of copper of about ⅜ inch in diameter, having a comparatively thin wall, would not come under the scope of claims.

Q. Have you finished your answer?

A. I have finished it.

Mr. Cooper: Would this be a point where you could conveniently stop the cross examination so that I may call the other witness?

The Court: Yes.

Mr. Frye: Whenever you are ready; yes.

The Court: If you gentlemen would like to have a recess, we will call one.

(Recess.)

J. Allen Harlan was thereupon called as a witness on behalf of the Plaintiff, and having been first duly sworn, testified as follows:

J. Allen Harlan, Sales Manager of Frigidaire, Testifies.

Direct Examination

By Mr. Cooper:

Q. Where do you live?

A. Dayton, Ohio.

Q. What is your business?

A. I am with the Frigidaire Corporation.

Q. In what capacity?

A. Sales Manager.

Q. How long have you been with the Frigidaire Corporation and its predecessor, the Delco Light?

A. Since the Institution of the Delco Light Company.

Q. On what date was that?

A. August 15th, 1915.

Q. And you have been continuously with these two companies in succession?

A. Quite so. I might amend that to state the Domestic Engineering Company was the predecessor of Delco Light, but they are all the same company, it is merely a change of corporate name.

Q. Are you an engineer by profession?

A. Only by training.

Q. Graduate of a technical school?

A. University of Michigan.

The Court: Which department?

The Witness: Mechanical engineering.

Q. Have you been familiar with the character of refrigerating machines for household units put out by the Delco Light, and more recently by Frigidaire Corporation, the Plaintiff?

A. I have.

Q. Are you familiar with the cooling apparatus?

A. I am.

Q. Is this exhibit 9 the product of the Frigidaire Corporation?

A. It is.

Q. And is that representative of its product?

A. It is.

Q. For how long a time has it been using an air cooled apparatus such as that?

A. As I recall it—I am relying upon my memory—the first air cooled was produced either in 1924 or 1925, I will have to refer to my records.

Q. You are now speaking of the commercial output?

A. Yes.

Q. Prior to that time had it been a matter of development by the Frigidaire or the Delco Light?

A. Yes.

Q. For how long a time did Delco Light have it?

A. Again relying on my memory, I think it was about 1921 we started our first air cooled development work.

Q. Did Delco Light put out water-cooled household units too?

A. They did.

Q. Beginning at what time, about, in a commercial way?

A. When we took over the manufacture of the Frigidaire apparatus in 1920, as I recall it, our only product at that time was a water cooled compressor.

Q. From what concern did you take over the business.

A. The Frigidaire Corporation, which was at that time another subsidiary of General Motors, which was amalgamating with the Delco Light Company.

Q. All of those you have mentioned are subsidiaries of General Motors?

A. All.

Q. Were you concerned with the building up of the trade in the water cooled units?

A. I was.

Q. To what extent?

A. In the starting of our marketing operations we marketed the Frigidaire Product through the distributors and the sales organization of the Delco Light Products, which were farm lighting outfits. My job was to head up the sales and sales promotion of the new product through the old organization, and as that organization grew and expanded it was my job to develop it and to see that it was properly functioning.

Q. Did you encounter any difficulties in the operation and service of the water cooled household type?

A. Yes, sir.

Q. State generally about that?

A. Well, the water cooled apparatus—you have got to divide the thing up, really, into three functions; the fuction of manufacturing, servicing the product, after it is produced, and the function of selling the product, or public acceptance. Now, from the manufacturing standpoint, in water cooled apparatus, any water cooled apparatus means the necessity for a water regulating valve. It is a difficult piece of mechanism, as we found in our experience, to manufacture. The kinds of water all over the country vary, they vary in temperature, pressure, commercial constituents in the water, lime, and that sort of thing, so the materials out of which that water regulating valve must be constructed needs a good deal of attention and a lot of care. We made many changes along that line which caused a great many difficulties.

From the standpoint of the customer, water cooled apparatus did not receive a very ready acceptance in the household field. We found that out from our own actual experience.

From the serving angle, the servicing of the water cooled job caused us a good deal of expense and a good deal of difficulty, and again from the manufacturing end, the building of the condensers for water cooled apparatus is a ticklish job because your water and your gas are in contact with each other, separated by a wall of pipe or something of that sort, and great care must be taken to see that the wall does not break down and get water in your S02 or S02 in your water. I would say our experience indicated generally it was a rather difficult field.

Q. Does your company still put out both air cooled and water cooled units for household use?

A. We do.

Q. Do you know the relative output of the two?

A. Again relying purely on memory, I would say that we put out about one of water cooled to somewhere between 25 and 30 perhaps of the air cooled compressors. I have not the figures before me, and I could not give you a definite answer.

Q. But very many more air cooled than water cooled?

A. A great deal.

Q. Now, do you now have knowledge of the advertising in a general way?

A. I do.

Q. What is the character of the advertising with respect to the air cooled over the water cooled, or vice versa?

A. Our advertising policy, except for the first announcements of air cooled, when we had no water cooled equipment, has been advertise the science of electric refrigeration and very little has been said about the construction of the apparatus, whether as to air or water cooled. If a particular compressor happened to be needed in an advertisement it might show it was air or water cooled, but that is not and has not been the advertising policy of the corporation. So that, as far as we are concerned, air or water cooled, it is up to the customer to more or less decide, in conjunction with his contact with the salesman, what he wishes to produce.

Q. Has there been any difference in the sales pressure from your company's standpoint with respect of air cooled or water cooled?

A. From the standpoint of the company I would say no, because irrespective of which is sold, we, ourselves—it makes no difference except from the standpoint of the customer. In other words, we sell one at a profit, or the other. The pressure has come from the sales organization, who more or less make up their minds from the customer's standpoint as to what they are interested in.

Q. You are familiar with the details of construction of the various refrigerating apparatus your company puts out?

A. I would say from the sales standpoint, yes.

Q. Can you answer this question, as to the extent of the use in air cooled units of a condenser coil made of copper?

A. Yes.

Q. How extensively has that been used?

A. In all our air cooled apparatus we use a condenser coil, a coiled-up copper tubing.

Q. To what extent has that been of ⅜ of an inch copper tubing?

A. As far as I know we have never used anything else, that is, of my knowledge only.

Q. And on the condensers?

A. On the condensers.

Q. Now, can you speak as to the advantages of that particular type of copper tubing, the ⅜ inch?

Condenser Tubing Must Be Free From Scale and of Uniform Bore.

A. Well, there are two ways you might get at that. There is an advantage from a manufacturing standpoint, from construction. A tubing of that size can be easily coiled, can be made scale free, is easily utilized in the apparatus, and it works, and from an engineering standpoint it functions properly in cooling gas to a place where it condenses into a liquid.

Q. What do you mean by "scale free"?

A. The difficulty of any copper tubing or tubing of any sort used in any refrigeration apparatus is the keeping it free from all foreign matter or scale.

Q. On the inside?

A. On the inside.

Q. What is the importance of having the bore or diameter of the tube uniform?

A. If you have any constriction in it it will slug with oil, oil coming down with the gas will trap there, or if it has enough constriction it will raise the pressure of the gas behind the constriction, so it must be uniform.

Q. Does that particular kind of copper tubing lend itself to your requirements in respect of the—

A. It does.

Q. You spoke of a "Slug," the oil coming down. Explain to the Court where the oil comes from, and what the general condition is in respect of that?

A. When oiling a compressor that is sealed in, as our is sealed in, the oil must be put in with the refrigerant, and as the gas is condensed into a liquid, the oil and gas go into a partial solution, so when liquid is being carried down through the condensing coil after it is condensed, and on into the boiler, it carries with it a certain amount of oil, and when the gas boils that oil comes to the top of the boiler and runs down back to the compressor from the suction line. If that tube is not the right size, or should have constrictions in it, the oil being of a slightly different specific gravity from the liquid S02, may trap, or if there are any projections down in the tube, such as might be caused by scale, it catches the oil and arrests the flow of the gas through the coil.

Q. I observe in plaintiff's exhibit 9 that the compressor and condenser coils are all mounted as a unit on a removable base. To what extent has that feature been utilized in the output of your company?

A. You are referring to the household output?

Q. Yes, the household output?

A. We have always done it.

Q. With respect to the air-cooled alone or both air and water?

A. Both air and water.

Q. What are the advantages of that?

A. Well, there is a definite advantage from a service standpoint in that, the unit is removable for service work. Or put it the other way around, if the condenser was fastened one place in the cabinet, and the compressor another place, and the receiver another place, it would be a very difficult proposition for the service man to get at the compressor to accomplish what work might be necessary. Then from the standpoint of marketing, it makes a unit—a package proposition. I might also add that is one of the very important things from the standpoint of a household unit, such as we are discussing here, it must be mobile, that is one of the advantages of the air cooled, and of course in handling a piece of apparatus of that sort it is of a very great advantage to be table to shift it with the compressor and coil and the lines and everything all hooked together, but if you did it that way, the man who is coming to service the job must be able to pull it out easily to make whatever changes in service is necessary.

Q. In the commercial development of your company's business has it to any considerable extent sold these units that you know of separate and apart from the ice boxes into which they go?

A. Oh, yes, we have sold them that way.

The Court: That is, install them right in the old ice box, do you?

The Witness: Yes, sir, the compressor in the basement and the coil in your old ice box. Again the same unit proposition of the compressor traveling as a unit, and the coil as a unit, makes it possible to so set it up.

Expense of Plumbing and Difficulty of Moving Unit Made Sales Resistance for Water Cooled Machines.

Q. In actual service from the housewife's point of view are there advantages of the air cooled over the water cooled in respect of being able to move one from place to place?

A. Quite so. That is the biggest sales resistance to the water cooled apparatus, the customer does not want the expense of plumbing and does not want the expense of paying for water, and wants to feel the apparatus is mobile.

Cross-Examination

By Mr. Frye:

Q. When do you say you first got into the refrigeration sales?

A. As far as I recall it now in the latter part of 1921 or early part of 1922.

Q. What is this date of August 15, 1915?

A. The time I became employed by the Delco, who use the parent of the domestic, who was the parent of Delco Light, who was the parent of Frigidaire.

Q. That date then of 1921 is probably when Frigidaire became interested in refrigeration?

A. No, not as far as I was concerned.

Q. When ahead of that did they get into it?

A. I couldn't tell you, I don't know.

Q. Can you tell us when you did come into the refrigerating field, were there air cooled household refrigerators being offered to the public?

A. Yes.

Q. And were they being used?

A. Yes.

Q. And were they serviceable?

A. Well, what do you mean by that word?

Q. Could they be serviced?

A. Anything can be serviced.

Q. Well, were they convenient to service?

A. I don't know. I never performed any service work on them.

Q. Do you have charge of the service as well as the sales department?

A. I have indirect supervision of it at the present time, yes.

Q. Do you have to train your service men to service competitors' machines as well as your own?

A. No.

Q. Your men do not do that, is that it?

A. No.

Q. Now will you enumerate one or two air cooled refrigerators that were on the market when you first came out in the field?

A. With the air cooled or how?

Q. When you first came with the water cooled, as I understand that was first.

A. Well, to the best of my memory, I think Isko was at that time in the field and I think Kelvinator: we also had that, the air cooled apparatus. I know they were a couple of years after I started getting into it.

Q. That was in 1921?

A. No, I would say it was before I came to the place where I could tell you much about competitors, it was probably the latter part of '22 I first started in with our own organization and paid very little attention to the competition.

Q. You have said Kelvinator and Isko?

A. These are the only two I can recall at this time.

Q. Were there any advantages which you have detailed quite elaborately in connection with air cooled machines and the Frigidaire, that were not included in the Isko and Kelvinator air cooled jobs?

A. What sort of advantages? Sales advantages, manufacture, service or what?

Q. You have detailed in connection with Frigidaire the various advantages accruing to the air cooled over the water cooled. Now my question is, Are those special advantages of Frigidaire or are they applicable to Kelvinator and the Isko jobs that were ahead of you on the market?

A. Well, of course in an air cooled apparatus it needs no plumbing and that is one of the adavntages; as to whether or not this particular piece of apparatus can be serviced more easily than water cooled. I am not in a position to state.

Q. Well let us put it this way. Do you know of any particular advantage of the Frigidaire air cooled appartus over the competitors' air cooled apparatus?

A. I am quite sure the Court would not want me to get into a sales discussion on the thing.

Q. Not as to details, but as you have done before, as to the advantages of being free from water, and liability of contamination with SO^2 and also I believe lighter and more portable; those are the three, as I remember, that you gave on direct examination.

A. I would say that the Kelvinator, as I know the machine today, needs no plumbing, that is a self-evident fact; it is lighter than if they were to attempt to make a water cooled machine, it has no water coil inside of the compressor dome, exactly as in the case of our machine; it has the factor of portability with a loss of water connections.

Q. Now you have pointed out a number of attempts, as I understand it, between 1921 and 1924, wherein Frigidaire attempted to bring out an air cooled apparatus?

A. I recall no such statement.

Q. Well, if there was any such statement made it is not true, is that the idea?

A. Well, we were working on an air cooled apparatus of course before we brought it out; you necessarily have to put in a considerable amount in engineering development.

Q. Have you knowledge personally of attempts on their part to work out an acceptable air cooled apparatus between 1921 and 1924?

A. Yes.

Q. That was in what field?

A. Research and engineering.

Q. I mean in the laboratory or sales field?

A. No, not in the sales field until it was announced, and while I am not able to give you the announcement date, I think the figures will be available to you when we announced the air cooled apparatus to the field, and naturally we had a good deal of experimental work to do before that date.

Q. And you know that they were doing it between those two dates, 1921 and 1924?

A. Yes.

Q. Can you tell us any of the steps that had to be gone through before they brought out Frigidaire?

A. Before the air cooled was brought out, from the sales or engineering angle?

Q. No, whether you were informed on it?

A. Not in detail, no. I kept in touch naturally as any sales management would with any engineering developments, but not in the details.

Q. You did not have supervision of it?

A. No, I did not.

Q. Now, you have made the statement that all of the air cooled condensers put out by Frigidaire have ⅜ inch copper tubing?

A. I said I thought to the best of my knowledge that that was the case, but I would have to refer that to the engineering department as to whether any prints had ever been issued on any other size.

Q. You don't mean isolated instances, or anything?

A. To the best of my knowledge, we have stuck pretty closely to ⅜ inch. In some cases we have used quarter inch, but I think we have gone back in every instance to ⅜.

Q. How about in your water cooled, what do you use there for condenser tubing?

A. Use a very much larger tubing.

Q. What size?

A. I would guess around a half—maybe not quite so large.

Q. Also copper tube?

A. Yes.

Q. Do you consider the model, Exhibit 9—

A. (Interrupting) Which is that?

Q. That is the Frigidaire model here.

A. Yes.

Q. (Continuing)—one of your latest model types?

A. No.

Q. Well, what kind of a radiator or condenser are they using in the 1929 model Frigidaire?

A. We are using a copper tube condenser with some fins on it.

Q. More like an automobile radiator?

A. No, automobile radiators are honeycomb type.

Q. Do you remember the old Ford radiator?

A. Yes. Some were more similar to that.

Q. Your present one is closer to the old Ford radiator, is that true?

A. Than it is to a honeycomb type radiator.

Q. Do you know what is known as the Flintlock Condenser?

A. I do not. I know there is such a thing manufactured.

Q. Do you know whether or not it is being used rather generally by competitors in your field?

A. I do not.

Q. Do you know the Fedders type radiator?

A. Just about as much as I know the one you mentioned before. I know there is such a type radiator or condenser. I believe it is a condenser, isn't it? But I have no personal knowledge of it and I don't know that I ever saw one except in the advertisements. My attention is rather directed towards my own product.

Q. What do you understand by a honeycomb radiator?

Mr. Cooper: I think I will object to this, if your Honor please. I have not gone into this question of competition at all. I rather confined my examination altogther to what the plaintiff,—

The Court: I think it is going beyond what this witness is here for.

Mr. Frye: Your Honor, the statement was made that all of them use that. I think it is self-evident, you can pick up a Saturday Evening Post and find they have not got them any more.

Mr. Cooper: If your Honor please, this witness was not interrogated about that.

The Court: As I understand it, his testimony is to give the history of his own company.

Mr. Cooper: That is all.

The Court: He did not try to go into the—

Mr. Frye: All right, his own company is not using this any more, as I understand it.

The Witness: Is not using what?

Mr. Frye: The ⅜ coil condenser.

The Court: Well, I will let you ask them very fully about what they are doing.

Mr. Frye: Well, that is what I am asking.

Mr. Cooper: No, that is not what you were asking, if you will excuse me.

Mr. Frye: I am going to bring out the differences, so that we will understand each other.

The Witness: All right.

Q. Now, you have made the statement that you have always used this ⅜ inch coil?

A. Quite so, to the best of my knowledge. Always quote me exactly, please.

Q. Of course, we only want your knowledge.

A. Quite so.

Q. Have you changed the shape of it recently?

A. In certain models. You asked me if that was one of our latest models, and I answered no, that particular model has been superseded by another model, but all of our models have not been changed.

The Court: You have this model still?

The Witness: We still are using a condenser exactly similar to that one in certain other models. In our Model E compressor, for instance, you will find almost identically that same condenser.

Q. Have you a model that uses a different type than a 3-8 inch coil?

A. Without fins?

Q. With or without fins?

A. So far as I know—

Q. (Interrupting) Now, remember a coil is in my understanding, a spiral like the old—

A. (Interrupting) Well, that is not the way we refer to a coil. Any coil of tubing, whether it is coiled up this way, or whether it is coiled up that way (indicating) is a coil as far as we are concerned.

Q. Well, let's get into the record clearly what you mean, then.

A. I realize you cannot put my gestures in.

Q. No. Is the new type a coil in the same sense as the one here before us?

A. You mean as a flattened out helix?

Q. No. I don't care whether it is a straight line or what it is. Just explain what you are using.

A. Perhaps I can put it this way, then—the Court will excuse my inexperience as a witness: The Model A compressor has a coil which is what we call a coil, though it is not wound on a helix of copper tube with fins on it; but it is still a coil of tubing as far as we are concerned, and it has fins to cut down the amount of tubing that is necessary to accomplish the amount of cooling we need.

Q. Well, compare it as to length: What would be the length of the copper tubing in the new model as compared to the one here?

Putting Fins on the Tubing Reduces Length Required.

A. In the Model A compressor—we will refer to it that way, if you will, please, because that is the way we designate it—the copper tubing is shorter, because the addition of the fins on the coil does not necessitate the length of tubing that is necessary without the fins on the coil.

Mr. Cooper: I think I can get some of those in the morning, if you want to establish the fact. I mean you need not spend time with this witness.

Mr. Frye: Well, I merely want to get on the record the exact facts. He says all of them had the 3-8 inch tube. I don't think that was true, I don't think he meant it that way.

Mr. Cooper: Well, those that are 3-8 inch tube, I had them measured and had the facts given to you about them, but I will produce a tube, that we can look at it for ourselves in the morning.

Q. Do you know whether this new type of radiator or condenser was used by Frigidaire ahead of its rivals or competitors?

A. I have no knowledge to that effect.

Q. You do not in your position—

A. (Interrupting) I would not know.

Q. (Continuing)—keep up with that?

A. No.

Q. What are the relative prices of sales of air and water cooled Frigidaires?

A. You mean at the present time? At the present time we have given up the manufacture of the small water-cooled appartus, so that I cannot give you relative figures from that standpoint.

Q. Then are these figures of 30 to 1 that you were giving us on a comparison, really comparative?

A. Certainly, because the only reason we discontinued this making the small water cooled appartus was because it was too hard to sell.

Q. Where do you sell the water-cooled today?

A. Well, we sell a few water cooled for the cooling of ice cream cabinets, we sell them in the larger compressors, half horsepower, one horsepower sizes.

Q. That would be for commercial use, you mean?

A. Well, you might call it that, yes. The small water cooled appartus was only discontinued a few months ago, because the production had dropped so low on them that it was not worth while to continue them in the line in view of the volume of the other stuff. As far as profit was concerned and so forth, we were perfectly willing to keep it in, but you cannot make the public take something they do not want.

Q. When you were selling them simultaneously, what were the relative prices for the household?

A. There was very little difference. I cannot recall without reference to records, but I do not believe, as I remember the thing now, that when the air cooled was announced there was over $10 or $15 difference between the prices of the two.

Q. How about the installation cost?

A. The installation cost, of necessity, is higher with the water cooled apparatus, because you have got plumbing to pay for, and you have got to pay union labor and things of that sort, which run the installation costs up.

Q. Taking the cost to a man like myself, who is buying a Frigidaire, what would be the relative cost of water cooled and air cooled by the time I am able to use it? Would it be $50 more, $100 more?

A. I don't think it would be as much as $50. As I recall the time when we were selling exclusively water cooled, naturally, one of our arguments was that the cold water would eventually, through the saving in current consumption, pay for your plumbing bills, so I can argue one way or the other, having had practice in both.

Q. Now, you argue for water cooling, is that the idea?

A. Sir?

Q. Now, do you argue for water cooled or air cooled?

A. Air cooled, most decidedly.

Q. And you teach your whole sales organization, I suppose, the same argument?

A. Naturally. They, having no small water cooled apparatus to sell, I would be rather indiscreet if we did not teach them to sell air-cooled.

Q. After you get it installed, which is the cheaper to operate?

A. It depends entirely upon the cost of your water and the cost of your current.

The Court: The cost of your what?

The Witness: Water and current. If you have very cold water and very cheap, and high priced current, the water-cooled, I think, would be less expensive to operate.

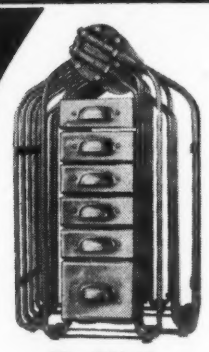
The Court: Electric current, you mean?

(Continued on Page 21)

COMMERCIAL EVAPORATORS
EXPANSION VALVES
CONDENSERS
EVAPORATOR HANGERS
ICE TRAYS

FEDDERS STANDARD APPLIANCES

DOMESTIC EVAPORATORS
SCALE TRAPS
LIQUID FILTERS
RECEIVERS
SUCTION SCREENS



No. EC-35 Evaporator
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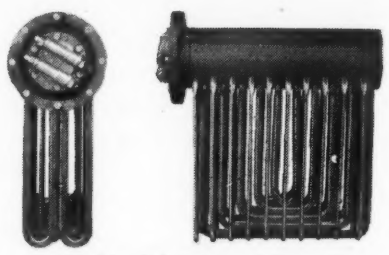
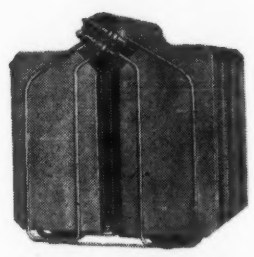
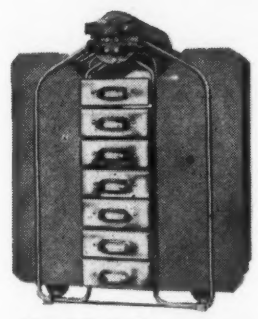
Minimum Ice Chamber:
Width 20", Depth 20", Height 32"



No. EC-3 Evaporator
Height 18½", Width 7½", Depth 17 11/16"
Minimum Ice Chamber:
Width 6½", Depth 17", Height 18"
Front View Side View

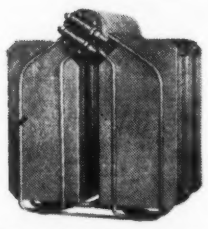


No. EC-50 Evaporator
Height 25¼", Width 24⅝", Depth 19 1/16"
Minimum Ice Chamber:
Width 28", Depth 21", Height 30"

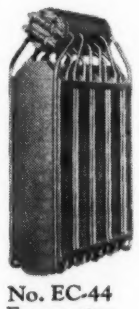


No. EC-40 Evaporator
Height 26⅞", Width 22 1/16", Depth 17 11/32"
Minimum Ice Chamber:
Width 25", Depth 20", Height 32"

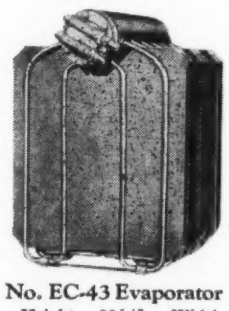
No. EC-47 Evaporator
Height 30", Width 16 3/16", Depth 19 1/16"
Minimum Ice Chamber:
Width 19", Depth 21", Height 35"



No. EC-45 Evaporator
Height 22¼", Width 20⅛", Depth 15 3/32"
Minimum Ice Chamber:
Width 23", Depth 17", Height 27"



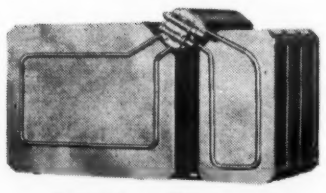
No. EC-44 Evaporator
Height 30", Width 7⅛", Depth 17¾"
Minimum Ice Chamber:
Width 9", Depth 21", Height 33"



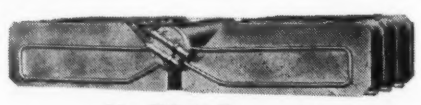
No. EC-43 Evaporator
Height 22¼", Width 15⅜", Depth 15 3/32"
Minimum Ice Chamber:
Width 18", Depth 17", Height 27"

No. EC-42 Evaporator
Height 18¼", Width 15⅜", Depth 15 3/32"
Minimum Ice Chamber:
Width 18", Depth 17", Height 23"

No. EC-55 Evaporator
Height 20¼", Width 48⅛", Depth 18 11/16"
Minimum Ice Chamber:
Width 50", Depth 22", Height 26"

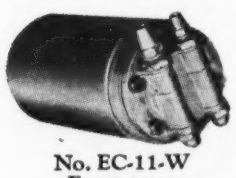


No. EC-53 Evaporator
Height 20¼", Width 34⅜", Depth 18 11/16"
Minimum Ice Chamber:
Width 38", Depth 22", Height 25"



No. EC-51 Evaporator
Height 8¼", Width 48", Depth 18 11/16"
Minimum Ice Chamber:
Width 50", Depth 22", Height 13"

No. EC-41 Evaporator
Height 12", Width 30¼", Depth 15 3/32"
Minimum Ice Chamber:
Width 33", Depth 17", Height 16"



No. EC-11-W Evaporator
Height 5", Width 5", Depth 10 23/32"
Minimum Ice Chamber:
Width 5½", Depth 12", Height 7"

No. EC-62 Evaporator
Height 7", Width 5¼", Depth 48"
Minimum Ice Chamber:
Width 7", Depth 54", Height 9"

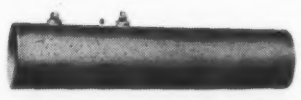
No. EC-67 Evaporator
Height 7", Width 5¼" Depth 60 13/32"
Minimum Ice Chamber:
Width 6½", Depth 61", Height 9"

No. EC-64 Evaporator
Height 7", Width 5¼", Depth 60"
Minimum Ice Chamber:
Width 7", Depth 68", Height 9"

LIQUID FILTER with following size fittings:
¼" Male Flared
⅜" Standard Pipe thread
¼" Standard Pipe thread
⅜" Male Flared
½" Male Flared
⅝" Male Flared

Liquid Strainer
¼" Male Flared Fittings

No. EC-66 Evaporator
Height 7", Width 7½", Depth 48 13/32"
Minimum Ice Chamber:
Width 6½", Depth 48", Height 9"



Liquid Receiver
to Customer's Blueprint Specifications

Non-Adjustable Hanger

Adjustable Hanger

Write or wire for bulletins on Standard Refrigerating Appliances (*sold only to refrigerating machine manufacturers*).

FEDDERS MFG. CO.

Buffalo, N. Y.

F. B. RILEY
Factory Representative
320 Beaubien St., DETROIT, MICH.

Frigidaire Production Figures 1921-1928 Entered in Record

(Continued from Page 20)

The Witness: Electric current, yes. If, on the other hand, you have hot water, as you have in certain sections of the country, or expensive water, or the use of the water actually is forbidden for small electrical apparatus, as you will find in certain sections of California, and cheap electric current, than the air cooled will take precedence on the economy of operation on the over-all. That is exactly why we make water cooled and air cooled apparatus in the larger sizes.

Q. Do you consider in the larger sizes that the water cooled is the more economical operation?

A. Referring back to my previous answer, it depends upon the price you are paying for water and current, and the temperature of the water. We are prepared to sell whichever is the most economical one to the user.

Q. Have you any figures? Take a city of, for instance, the size of Detroit, the usual city service water and the usual cost for electricity, comparing the water and air cooled operation.

A. No, I don't believe I could give you anything on that. Anything I could give you would be casual figures that might confuse the Court.

Q. Well now, tell us, does the water flow at any time except while your motor is operating?

A. Yes, the water flows for a period of time after the motor has stopped. It flows until the gas which the water is condensing has lowered its pressure sufficiently to close off the water valve.

Q. There is an automatic valve that is controlled by what—pressures?

A. Usually, at least in our apparatus it is controlled by the pressure of the gas in the condensing chamber.

Q. Does it close after a predetermined time after the shutting off of the motor?

A. Not a predetermined time; a predetermined pressure.

Q. Time has nothing to do with it?

A. No. In other words, if your water were 44, your water might shut off in one half minute from the time that your compressor is shut down. If the water were 120 it would run forever, because it would not do any condensing; so it is the lowering of the pressure in the gas in the condensing chamber that cuts off your water valve.

Q. You say you have no figures for actual cities?

A. No, anything I would give you would be guess, and I would not care to have it read into the records.

Q. Have you any figures for a farm, for instance, where water would cost nothing after you once had your well or something connected up for a pipe?

A. Water always costs you something, because you have to pump it.

Q. A pump is part of your apparatus, isn't it?

A. Not with the compressor, no. There is nothing connected with the compressor to pump any water up, unless you have an artesian well under pressure on your farm.

Q. Don't you have an apparatus that you can put into farm houses to pump, that goes with your apparatus?

A. No, not that goes with it. The Delco Light Company manufacture and sell both a shallow well and deep well pump,—glad to send you circulars.

Q. But that is not part of Frigidaire?

A. It is not part of Frigidaire, no.

Q. You don't build one for the country trade?

A. No. Our sister corporation does that for us.

By the Court:

Q. You said there was a small difference of ten or fifteen dollars between the price of the air cooled compressor and the water cooled compressor. Which was it?

A. The air cooled was cheaper. That is, there was one particular phase when the air cooled was cheaper; when the water cooled kept going down and down and down, we cut the price almost to nothing to get rid of the water cooled stuff we had and I have still got some of it.

Q. You told us of several advantages of the air cooled over the water cooled, and you have suggested a possible advantage of the water cooled over the air, where water is cheap?

A. Quite so.

Q. How, are there any other advantages to be put in the scale in weighing the problem? I take it you have covered then all that occurs to you about the air cooled over water. My query was whether or not there were any more possible advantages, or advantages to think about, in connection with water cooled over air?

A. The only advantage that I knew of, your Honor, in comparing air and water cooled which the water cooled has, is that where your current is high priced, your water is cheap and cold, that under those conditions, the water cooling will operate for less dollars per month, even paying for the water and paying for the current; but the other advantages are in the favor of the air cooled, from the customer's standpoint.

Q. From the standpoint of satisfactory results, there is no difference in either one, I take it, as to the product?

A. From an operating standpoint, one made well or the other made well will give service to the customer.

The Court: All right.

By Mr. Frye:

Q. One more question, if you please: Has the price of air cooled Frigidaire been constantly lowered during the last few years?

A. Yes.

Q. How about water cooled?

A. Our prices naturally must keep parallel, because if we throw a strong advantage to one or the other, we are out of luck. When you consider that the corporation had a good many hundred thousand dollars in money invested in the tools and the equipment to manufacture the water cooled apparatus, I think you can easily see that we would not have retired it from the line had there been a ready market for it, because the scrapping of those tools naturally means money, and had it been possible to keep that in the line even bringing prices down, the small water cooled, or, as we know it now, the model H compressor would have still been in the line. It was to our definite advantage from a money standpoint to keep the job in the line if we could get satisfactory volume of production on it to justify its retention in the inventory; but we could not.

Q. At least, you did not. Did you make any special effort to sell it?

A. Oh Lord, yes. Pardon me, your Honor.

Q. What effort more special then you made for air?

A. Cut the daylights out of the price.

Q. But never got it below the air cooled?

A. Yes, I did not say that we did not cut it below the air cooled. If you will read back, you will find where I said we reduced the price to almost nothing to get rid of the last end of it. I could buy you one today for $50.00.

Q. Let's go back a few years, say 1921, now. Now, when was it you first brought out your air, in 1924?

A. I would have to refer to the records on that. As I recall it, we announced it in 1924. Maybe it was 1925, I don't know.

Q. Well, let's take, for example, 1925. What was the relative cost of air cooled and water cooled to the public?

A. Well, of course,—oh, to the public? I think I gave you a previous answer on that, that at the time we announced the air cooled, I did not remember that there was more than $10 or $15 difference in the cost of the compressors.

Q. That is, at the very start it was that way?

A. Yes.

Q. And that, of course, is plus installation charges and you don't know how much they would be?

A. No, because they varied in every territory in the United States, depending on whether our men could go out and put in the plumbing, or whether he had to hire a Union.

Q. Have you any idea of what the average would be—$25 or $30?

A. I think undoubtedly, the plumbing would cost somewhere around $25, anyway.

Q. Now, beginning at that, what was your sales price cuts, just tell us in a few words what you naturally did do with the water job?

A. Well, you will find that even after we produced the air cooled, for a short period of time, while we were driving like the dickens on it, the water cooled sold, still increased in volume, but it did not increase as rapidly as the air cooled did.

Now, factory economics will tell you that the more volume you can get on any one particular job, the less price you can sell it for; and the price cuts that have been made in the Frigidaire apparatus from time to time have been due to increases in volume, so naturally, if the volume of a particular product does not increase as rapidly as some other product increases, that which has the greatest gain will naturally have the advantage from a price standpoint.

Mr. Frye: That is all.

By Mr. Cooper:

Q. Can you tell me what ranges of size of air cooled refrigerators have the half inch condenser tubing?

A. The only one that I am certain of is the small model H discontinued model, which was a dome type of compressor with a three loop or four loop water coil stuck into the compressor chamber, and the coil had water flowing through it instead of having gas flowing through it, and the gas was in contact with the cooling coil, and that took the heat out of it and caused it to condense.

Q. I think you did not quite get my question; On the air cooled type, I want to know the range of sizes of instruments, or boxes, all of which had three-eighth inch condenser coils?

A. Oh, I would say we could take care of the compressors that had ⅜ inch tubing on them would handle anything from four cubic feet—that is the smallest we make—up to 18, which is the largest we make—any range in the household sizes.

Q. Cubical contents you have given is what?

A. That is the cubical contents of the food storage space. The coil compartment is included in measuring food storage space.

Mr. Cooper: That is all.

By the Court:

Q. You have spoken of large size and small size. Plaintiff's exhibit 9, the plaintiff's size box here in court, falls into which class?

A. That is a seven cubic foot box, which is coming pretty close to the middle.

Q. In your classification of large and small, where does that come?

A. We consider anything of four, five or six feet as being our small sizes, our sevens and nines are our middle size, and our 12 and 18's are our large size.

Q. This is which?

A. It is really what we consider our medium size box.

Q. Where would you classify defendant's box there, plaintiff's exhibit 7, that I believe is about a five cubic foot box?

A. That is our small sized box.

The Court: All right.

By Mr. Frye:

Q. Do you still sell the model before us here, with that water cooled condenser?

A. That particular model?

Q. Yes.

A. No.

Q. We are referring to size, not models, seven feet, or whatever you—

A. Well, we have no—since the discontinuance, which I have described at great length of detail, of the model H compressor, we have no compressor of a small enough size to handle that sort of thing economically

Mr. Cooper: In the water cooled?

The Witness: In the water cooled type.

Q. (By Mr. Frye) What is the smallest water cooled you have at present?

A. I guess it is a half a horsepower compressor. I would have to look at the price book before I could tell you that.

Q. How about any comparison with the seven cubic feet?

A. Well, you could put a flock of seven cubic feet boxes on a half horsepower compressor.

Q. Well, is that 50 cubic feet, or what is it?

A. A half a horsepower.

Q. Yes, but that doesn't mean anything to me. I would like to have you compare?

A. Well, I would say that a half horsepower compressor will handle very comfortably a 65 or 70 cubic foot box. It depends again upon the temperature you want. If it is a freezer case, it has to be a much smaller box. If it is for cooling furs, or something like that, it would handle something very much larger. The functions of temperature and size and heat leackage and all that sort of thing are tied together; you cannot distinguish one without the other.

Q. Is this the smallest water cooled job?

A. As I recall at the present time, without referring to my records.

The Court: What are these exhibits that you have got here?

A. Those are air cooled.

The Court: I thought something was said about their being water cooled.

Mr. Cooper: No, none of these.

The Court: It was not?

The Witness: None of the exhibits are water cooled.

Mr. Frye: I said that same model, same size, in the water cooled, and he said no, they don't sell that any more, they have discontinued it.

The Court: All right.

Mr. Cooper: This witness may be excused altogether.

The Court: You don't want this witness?

(Witness excused.)

Floyd O. Pansing was thereupon called as a witness on behalf of the plaintiff, and having been first duly sworn, testified as follows:

Direct Examination

By Mr. Cooper:

Q. Please state your full name?
A. Floyd O. Pansing.
Q. Where do you live?
A. Dayton, Ohio.
Q. What is your occupation?
A. I am with Frigidaire Corporation.
Q. In what capacity?
A. Assistant Secretary and Assistant Treasurer.
Q. Were you with the Delco Light before the Frigidaire Corporation was started?
A. I was.
Q. In similar capacity?
A. Yes.
Q. Do you have under your general supervision the figures showing the output of refrigerators of various sizes and types?
A. Why, due to my connection there they are available to me through the financial reports that are compiled by our comptroller's division.
Q. Were such figures compiled at counsel's request, under your direction?
Q. These figures I should like to call for, are those which show the output by years beginning with 1921, of the water cooled devices, and whenever it did begin with the air cooled devices. Have you those?
A. I have.

Mr. Cooper: I imagine the best way, if your Honor please, would be, if my brother has no objection, just to read these figures on the record.

Q. These are numbers of units?
A. Yes sir, compressors.

The Court: You may read them into the record.

Mr. Frye: There is no objection.

Mr. Cooper: Well then, I can just have the stenographer write them, or shall I read them off to your Honor?

The Court: I don't know but what counsel and the Court would be interested.

Mr. Frye: I would like to have the detail in the record. I don't think it means particularly much so far unless he can explain what the units are. Let's get started, anyway.

Mr. Cooper: The water cooled for the year 1921 were 365. For 1922, 2193; for 1923, 4705; for 1924, 12970; for 1925, 22456; for 1926, 30325; for 1927, 38515; for 1928, 39015.

A total for water cooled in those years of 150,544.

The air cooled, beginning in 1924, 7,036 for that year; 1925, 39,585; for 1926, 133,617; for 1927, 168,488; for 1928, 224,808. Being a total of 573,534 of the air cooled.

Q. Did you have prepared, or was there prepared, this graph showing the same figures, or the results of the same figures developed into these graphing lines?
A. Yes sir, showing that with these figures.

Mr. Cooper: I should like, if your Honor please, to offer that in evidence.

(Graph referred to was thereupon marked "Plaintiff's exhibit 12" by the reporter.)

Mr. Frye: What is that, if your Honor, please?

The Court: Simply a graph supporting, as a result of, these figures; putting it on the curve.

Mr. Frye: We have no objections.

Q. Now, have you prepared figures which show the total number of units, having the compressor, condenser and motor, in a unit at the bottom as distinguished from the arrangement of similar parts at the top of the box?
A. You refer to cabinets?
Q. The cabinets, yes.
A. Yes.
Q. Will you let me have those figures? I will read those off, if I may:

For 1921, the bottom arrangement, 300; 1922, 2,200; 1923, 4,300; 1924, 8,500; 1925, 22,000; 1926, 72,371; 1927, 83,691; 1928, 142,934.

The Court: What are those figures you have just read to me?

Mr. Cooper: Those are where they have sold the complete apparatus with the arrangement of the compressor, et al in the bottom, according to exhibit 9.

The Court: As a unit?

Mr. Cooper: As a unit. That is where they sold the complete refrigerator with that installed in the bottom.

Now, where they have sold the complete refrigerator with the parts at the top, that did not begin until 1927. Then they sold 32,276, and in 1928, 20,087.

Q. When you gave the set of figures that covered your compressors, just what did you include in the compressors, the units, the mechanical units sold separate from the boxes and also the boxes including the mechanical units all complete?
A. That covers all compressors.

Mr. Frye: Will you read that last question, Mr. Stenographer?

(Last question and answer read by the reporter.)

Mr. Frye: That was the second—

The Witness: No.

Mr. Cooper: No. (Explaining figures to Mr. Frye off the record.)

By Mr. Frye:

Q. What part, Mr. Pansing, did you have in the preparation of these figures?
A. I had them prepared for me by our comptroller's department, who compiled these figures.
Q. Well, have you the intermediate sheets for instance, could you tell us how many of model A or model H are whatever it was?
A. I have not the detail on that. It is just a total of water cooled and air cooled compressors.
Q. Are they all household jobs?
A. No, this covers all compressors.
Q. Have we any way of comparing household to household in air and water?
A. The different models?
Q. Well, different models or totals; have you any way of doing that?
A. Well, I have not that information available. The sales department at our plant, I have an idea, filled up the sales statistics on that. It does not interest us primarily except from the standpoint of dollars and number of units.
Q. Well now, are these schedules just taken from the actual sales, or were they taken from the accounts that were paid?
A. What do you mean by sales, orders or billings?
Q. That is what I am trying to bring out. How did you do it? Was it by orders or by accounts, or what?
A. These are picked up right from our financial statements and your financial statement is built around your billings, not orders.
Q. And all the numbers that are included here, you received your accounts in full for, is that the idea?
A. Well, we may not have received our accounts, we may have them on the books. They represent billings.
Q. You would not make a billing until after delivery had been made, would you?
A. That is right.
Q. And would you make it before you received your money?
A. Make the billing?
Q. Yes.
A. Invariably, it is.
Q. You send that out,—
A. (Interrupting) Once in a while we are fortunate enough to get cash with orders.
Q. Well, very seldom, I presume; but this billing goes out, and you have no way of knowing whether the money came in or not?
A. No, I could not tell you on each individual unit.
Q. You have nothing here to show?
A. No.
Q. Have you any idea as to whether the water cooled was more profitable than air cooled to the company, or anything like that?
A. I have not those figures available. Mr. Harlan has already explained that, I think.
Q. I am afraid that he did not explain it very well.

Mr. Cooper: Not to your satisfaction.

Q. Let's see. You are assistant treasurer, are you not?
A. I am.
Q. Can you tell us whether Frigidaire has ever made a profit during the time you have been there?
A. Can I? Yes, sir, I can.
Q. Has it ever made a profit?
A. Yes, sir.
Q. In what year or years?
A. Well, I think possibly excepting 1921.
Q. In every year except 1921?
A. As I remember. I cannot tell you exactly about that, but I know we are on a satisfactory basis.
Q. Satisfactory to whom?
A. General Motors Corporation.
Q. How long have you been in that department as assistant treasurer?
A. About two years with Frigidaire Corporation, and I was previously assistant treasurer under the old Delco Light Company; assistant secretary possibly six years.
Q. Well, that is practically ever since they have had the refrigeration, isn't it?
A. Yes, practically so.
Q. I call your attention to a purported report furnished by the Frigidaire Corporation, and it is published here in the Electric Refrigeration News of August 1, 1928. I think it was in turn quoted from the Wall Street Journal; but I would ask you if you recognize it as a report that you made out or that was made under your supervision.

Mr. Cooper: I think, if your Honor please, I will object to this. That cannot be competent in the form it was put, and it cannot be material on any issue that I see raised in the case.

The Court: Why are we concerned with whether they have made a profit or haven't made a profit?

Mr. Frye: Your Honor, it is the statement that they did make a profit that surprised me so much.

The Court: Well, you brought that out.

Mr. Frye: Exactly. This particular statement shows that they owe $34,000,000.

The Court: That might be.

Mr. Frye: I know, and then their entire assets something like $18,000,000; and yet they say it is a satisfactory condition, and they have made money. I am surprised at it.

Mr. Cooper: I am not surprised at my brother's curiosity, but I am raising the question whether it is an admissible question.

The Court: I don't see how that would help me at all.

Mr. Frye: Well, here is a schedule put in for some reason. It shows every year since the beginning a large increase in numbers of sales, but apparently, a consequent decrease in results. Now, the preceding witness, the sales manager, has told us that they cut the guts out of their water cooled. Now, I would like to show the result of it and how it is really being used in the trade. Now, these figures cannot help a patent case. I think that is almost self-evident. They did not invent water cooled, they did not invent air cooled, and I don't think they contend it.

Now, they are putting figures in for some reason. I want the parallel of what the results are.

The Court: Well, I really do not see the applicability of it, but there has been no objection and you have got in here the statement that they have made money, and if it is—that has been published, evidently, so that I am not invading any secrets here. I think I will let the witness reconcile the two, perhaps.

Mr. Cooper: May I suggest that, if your Honor please, under these particular circumstances, the only question to this witness is, can he state that this is a correct statement? According to counsel's asseveration it was published in some journal with which he had nothing to do, and he says it was copied from a Wall Street journal, with which we had nothing to do. Therefore, there is no connection between that and this unless the witness can, of his own knowledge recollect that as being a true and correct statement.

The Court: I say he may be familiar with this publication; I don't know.

Mr. Frye: Your Honor, it is a sworn tax return that must have been made out by the Treasurer's department. I happen to have it in that particular one—I think this witness will recognize it.

Mr. Cooper: No, I challenge counsel's statement. It is a newspaper,—

The Court: I will let the witness say what he does know about that.

The Witness: What is your question, please?

Q. Do you recognize that statement as one made up in your department?
A. This was made up in the comptroller's division; I am familiar with it.
Q. What is it, a sworn tax statement, or what kind of a financial statement?
A. It is a sworn statement of assets and liabilities.
Q. Well, for what purpose was it made up, if you know?
A. Well, as I recall, it had to do with a tax report in Massachusetts.
Q. Now, I would ask you to read into the record the accounts payable scheduled in that particular statement.

Mr. Cooper: I will object to this. If counsel wants to offer anything in evidence, now, he may.

Mr. Frye: I want to read into the record two items, and we will offer the entire—

Mr. Cooper: No, I think if a thing is going to be read into the record, it should be read in entirely.

Mr. Frye: We ask the witness to read it in its entirety then.

Mr. Cooper: Well then, that is for the stenographer to copy.

The Court: All right.

By Mr. Frye (resumed):

Q. Now, when that has been read in, I would ask the question to point out which item represents accounts payable. What is the amount of this?
A. According to this report, $34,428,959.
Q. What is the item for fixed assets, the item or items?

Mr. Cooper: If your Honor please, I don't think this ought to be gone over again. It is assumed to have been read on the record.

The Court: That is in now, so what is the question you want to get?

Mr. Frye: Your Honor, when you see a big thing like that, you look for two or three. Let's schedule them. It won't take a minute. It is already in, anyway. He is used to it and you may not be, and I know I am not.

The Court: Well, all right.

Q. It is a question of fixed assets. There ought to be about three items, I dare say, machinery, material on hand, and perhaps you have got it subdivided further; but will you tell us what those are?
A. You want each individual item?
Q. Well, aren't there only three or four of them?
A. The name of the item and the amount?
Q. That is the idea.
A. Well, here is real estate, $8,572,290.
Q. Go right ahead.
A. Machinery, $9,034,442.
Furniture, fixtures and tools, $832,078.
Auto trucks, etc., $333,991.
Q. How about material?
A. That is not fixed.
Mr. Cooper: Merchandise?
The Witness: Merchandise in inventory.
Q. Have you finished your fixed items?
A. Yes, sir.
Q. How about material on hand, either in parts or entireties?
A. Well, that is merchandise, that is inventory.
Q. What is that figure?
A. $14,023,026.

Mr. Frye: That is all that we want. Will you mark that particular thing?

The Court: I suppose there is accounts receivable in there?

The Witness: Yes, sir; not in the statement here—notes receivable $155,229; accounts receivable $4,778,644.

Mr. Frye: Will you give him that to copy into the record?

The Court: I don't get what that would prove.

Mr. Frye: Your Honor, they are going to claim—

The Court: You would have to go back of that and start in on a shoe string. That would involve—I don't want to go into that, but you could not prove anything by that, I take it, unless you know how much money they put in, and if you were going to check around back to see if they made money or not, I have got a lot of other data that I would have to require for the problem. I don't think you could base any argument on what you put in.

Mr. Frye: We are up against this problem: They claim that two patents are the basis of this whole industry. We claim that those particular patents were never successful. The Domelre had them first and went busted; the Isko went busted, over $3,000,000. These folks have reached $34,000,000 accounts payable, yet they say they are making the industry—we don't believe there is anything to the argument that the patents are what did it, and we would just like to get the basis in to show the actual status of the plaintiff company.

Reporter's note: Following is copy of the assets and liabilities statement referred to above.

(Continued on Page 23)

OUTPUT OF FRIGIDAIRE COMPRESSORS SINCE 1921

	Water Cooled Compressors	Air Cooled Compressors
1921	365	
1922	2,193	
1923	4,705	
1924	12,970	7,036
1925	22,456	39,585
1926	30,326	133,617
1927	38,515	168,488
1928	39,015	224,808
Total	150,544	573,534
Total Water and Air Cooled		724,078

Included in the above totals is the output of self-contained units, with cabinets, having machine at the bottom as follows:

1921	300
1922	2,200
1923	4,300
1924	8,500
1925	22,000
1926	72,371
1927	83,691
1928	142,934

Purchase of Wolf and Kramer Patents by Frigidaire

(Continued from Page 22)

Assets

Real Estate	$ 8,572,290
Machinery	9,034,442
Furniture, Fixtures and Tools	832,078
Auto Trucks, etc.	333,991
Merchandise	14,023,026
Notes Receivable	155,229
Accounts Receivable	4,778,644
Cash	275,302
Deferred and prepaid expenses	538.178
Good-will and Patents	11,994
Total	$38,555,174

Liabilities

Capital Stock	$ 100,000
Accounts Payable	34,428,959
Surplus	554,785
Accrued liabilities	68,925
Reserves	3,402,305
Total	$38,555,174

The Court: Well, I would have to know how much was put in and all that before I would know whether this shows solvency; I don't know whether it is all money made out of the two patents or not, or where they got it.

Mr. Frye: I was rather surprised that they had made a profit each year.

The Witness: I did not say each year.

The Court: Except 1921.

The Witness: 1921.

The Court: That is the first year.

The Witness: Well that is—yes, that is right.

Q. To answer the Judge's question, what is your capital stock, if you remember?

A. $100,000.

Mr. Frye: A number of patents were put in here too, your Honor—

The Court: The property, added to the $100,000 they put in, would still show a profit—

Mr. Frye: It shows solvency.

The Court: If they started with a hundred thousand—

Mr. Frye: And they now own $34,000,000 accounts payable.

The Court: But they have got—

Mr. Frye: We don't want to argue the question of whether they are particularly solvent or not, that is not the point in this at all; we just want to show the actual financial condition of this one, and we are going to show what happened to these others that tried to make good under the Wolf and Kramer patents.

The Court: Among their assets they all appear as though they cost real money except that $11,000 of good will. The rest of it seems to be things that cost money. Maybe they get it in here for more than they paid for it, maybe that real estate they bought cheap and it has increased in value, maybe they made money on the advance in the real estate, but I cannot draw any conclusion from that as it now stands.

Mr. Fyfe: We do not believe we would be permitted to give any analysis of the company's statement in a patent suit. It is the only known instance as far as we were able to find where publication was made of that statement, and as I say, I was rather surprised to learn there had been a profit. I could not challenge the question in the least, but merely make the statement.

Mr. Cooper: You are one better off than we are, we can't get any known instance of a statement from you.

Mr. Frye: Yes, you can find it every year, published at Lansing.

Mr. Cooper: We have not found it.

Q. Noticing your first table on the water cooled, beginning in 1921 and ending in 1928, you have always sold an increasing number, each year, of water cooled units. Have you any idea how many of those were household and how many were isolated?

A. I couldn't tell you.

Q. You have heard Mr. Harlan's statements that the household water cooled units or machines have been discontinued. Have you any way of telling what the effect will be? Is there anything I can deduce from these figures as to whether the water cooled will be out of existence at the end of this year, or whether they will be increasing again?

Mr. Cooper: I think that is purely speculative, your Honor.

Mr. Frye: I am trying to find out, to see if there is anything we can do.

Mr. Cooper: I am trying to raise an objection to your question. I think it is inadmissible.

Mr. Frye: Let us ask Mr. Cooper, off the record, do you intend this record to stop at 1928 or—

Mr. Cooper: Well, it has to stop very soon after that unless you continue the trial at the rate you are going so that the trial will last through 1929. I cannot help you with figures in 1929 when we are so early in the year.

Mr. Frye: But we can tell whether the discontinuance has been set for 1929 or whether it is something that is going to be gradually wiped out. That is what I have in mind—

The Court: Up to the date in 1929 I take it—

Q. Are they completely off the market?

A. No, we still have some in stock. Mr. Harlan made that statement.

Q. That is exactly what I understood. I would like to know if you have any way of knowing whether this will continue to show an increase, or whether you intend that the water cooled was to peter out.

Mr. Cooper: We don't intend it, it is business that has petered out.

Q. Well, when you cut them off your price list there must be an intention about it: I should say this witness would know what the intention was.

Mr. Cooper: Well, I should say he would not. You can ask him and find out.

The Court: State the question.

Q. Do you know whether it was the intent, as expressed by Mr. Harlan's discontinuance of the sale of water cooled, that this figure 39015 in 1928 would be nothing in 1929 or whether it was to be gradually—

A. Well, it cannot be nothing in 1929, because we still have some of the water cooled models on hand.

The Court: Have they sold some since January 1st?

A. But built last year.

The Court: So, there are some all ready to go in on 1929.

The Witness: I presume so.

Q. Have you any idea how many that will be?

A. I couldn't tell you because we just recently completed up to 1928 figures, and I am not familiar with what the records are—

Q. That is what I am getting at. You haven't a figure showing the amount on hand?

A. No, 1929; no sir.

J. Ralph Fehr, was thereupon called as a witness on behalf of the Plaintiff, and having been first duly sworn, testified as follows:

J. Ralph Fehr, Frigidaire patent attorney, tells of patent negotiations.

Direct Examination

By Mr. Cooper:

Q. Where do you live?

A. I live in Dayton, Ohio.

Q. And what is your occupation?

A. I am a patent lawyer, what you call a house attorney at the Frigidaire factory.

Q. How long have you been in that sort of a relation with the Frigidaire Company and the Delco Light?

A. I have been in that relation since 1920.

Q. The entire time?

A. Yes. I better qualify that—for about two or two and a half years I was in business for myself, in partnership, and retained on this work.

The Court: But now you are giving it your entire time?

The Witness: Yes, sir.

Q. So that continuously you have been in the same relation with the company and for all but two years exclusively for it?

A. Correct.

Q. Did you have to do with the purchase of the Wolf patent in suit?

A. Yes, sir, I puchased those, and they were assigned to me.

Q. And your purchase was for the benefit of the then Delco Light, was it?

A. Yes, sir.

Q. And you re-assigned it, made a reassignment to it?

A. Yes, sir.

Q. What was the circumstance that led to this purchase?

A. Well, shortly after we went into the refrigeration business commercially, we learned that the Isko Company, a manufacturer of household refrigerators in Chicago, had become bankrupt, and a receiver was offering the assets for sale, and we learned it through the auctioneer's notice of the usual character.

Q. At that time did your company have under development an air cooled refrigerator?

A. Not directly; one of the other subsidiaries of General Motors was working on one.

Q. And the work was being conducted there in Dayton?

A. Yes, sir.

Q. And to your knowledge?

A. Yes, sir.

Q. Did you, prior to making this purchase, make an investigation and form a judgment with respect to the Wolf patent?

A. Yes, sir, I did. I made an investigation as to which type—as to the validity of the patent, and found no art which, at least, I considered as anticipatory, and the patents are very broad; and it seemed to us valuable claims, and would seem to be necessary for entrance into the commercial field with an air cooled refrigerator.

Q. According to the plans of the General Motors Subsidiary that you knew about?

A. Yes, sir.

Q. Now with respect to the Kramer patent that appears by the assignments in evidence here to have been acquired by Delco Light in December 1924, and previous to that, immediately previous to that, to have been owned by Ballsa Refrigerator Company, and ahead of that, the Frigidor Corporation. Had that patent been called to your attention while it was owned by one or the other of those concerns?

A. In 1921 while that patent was owned by the Ballsa Refrigerator Company we were charged with infringement of it by reason of a unit such as that Exhibit Number 9 having in it a water cooled compressor in the bottom.

Q. Similar to that unit, by that you mean that the compressor and motor and so on at the bottom of the unit?

A. At the bottom of the cabinet; yes, sir.

Q. Subsequent to the receipt of that notice did you have an investigation made of that patent?

A. Yes, we investigated that also in the usual way, quite naturally, having received notice of infringement, but we found enough which was anticipatory in our view, and we subsequently had an opportunity to purchase the patent, together with one or two others, which we did.

Q. At the time you made the purchase of the Wolf patent there were other properties included in the purchase?

A. Yes.

Q. And other patents?

A. Yes, mostly patents and patent applications. There were quite a number of patents, I do not recall, the assignment records will show; but there were about 20 or 25, possibly 30, and a similar number of applications, probably less.

Q. Did you at the time of the Wolf purchase form an opinion as to the relative value of the other patent properties with respect to what has now become the Wolf patent in suit?

A. This Wolf patent in suit was a primary reason for our buying those patents; there were others in the group of comparatively lesser value, but the Wolf patent was the outstanding—

Q. With respect to the Kramer patent in suit, what was the order of its importance by comparison with the other things that you bought in that purchase?

A. It was the whole reason for our purchase.

The Court: What else was there with the Kramer?

The Witness: There was another Kramer patent, a sort of brother or half-brother of this one, dealing with the same subject, but slightly different—an improvement of it.

Q. Was a substantial consideration paid in each of these purchases?

A. I should say there was.

$17,000 paid for the Wolf patents.

Cross-Examination

By Mr. Frye:

Q. What was that substantial consideration in the Wolf instance?

A. $17,000 cash.

Q. For 25 patents and 25 applications, I believe you said?

A. Yes, sir.

Q. When this particular suit was brought do you know how many of the patents that you purchased at that time were enumerated as in this particular suit?

A. I don't think I understood the question.

Q. This suit was originally brought on seven patents?

A. That is correct.

Q. How many of those patents were purchased simultaneously with the Wolf patent?

Mr. Cooper: Could he refresh his recollection as to that?

Mr. Frye: I would be glad to have him do so to save time.

The Court: You may state the answer for him if you know it.

The Witness: Five of the patents purchased from the Isko were originally involved in this suit.

The Court: Four besides the—

Q. Four besides the one that is still in suit, is that correct?

A. That is correct.

Q. Did you investigate and make a judgment about each of those five prior to the purchasing?

A. I did not. The time for doing it was very short.

Q. About what was the time between the time you learned of this Receiver's sale and the actual negotiations to purchase?

A. I should say not more than a month.

Q. And your researches and plans were made in the month?

A. That is correct.

Q. Who decides whether you buy those things. Was it yourself or—

Mr. Cooper: I will object to any general question on the question of decisions; in each of these instances I have no objection.

Mr. Frye: I am speaking of the Wolf one at the present time.

Q. Did somebody instruct you to buy it, or have you the decision in the final instance?

The Witness: I recommended that we buy them, and made that recommendation to the general manager, who secured the necessary authority which allowed me to go ahead.

Q. And the same procedure was followed in connection with the Kramer purchases?

A. In the Kramer purchase I made that on my own decision.

Q. What was the consideration in the Kramer purchase?

A. $4,000.00.

Q. For two patents, one of which is in suit?

A. Yes, sir.

Q. Do you know whether simultaneously with the notification of the then Delco Company and the infringement of the Kramer patent that they also notified a lot of other companies?

Mr. Cooper: I think that is objectionable, it does not seem to me that that is—

The Court: The objection is overruled.

The Witness: I think we notified possibly two or three, I would say three at the outside, of other companies; there was no general notification, if that is what you mean, in the nature of scaring the trade.

Q. And when you purchased the Kramer patent did you follow up those notifications or drop them?

A. These notifications took place at about the time of the notification in this suit, which I think was in 1928. It followed up two or three or four, whichever there were.

Q. I wonder if we are talking of the same thing. I am speaking of the time when the then owners of the Kramer patent notified you of the infringement.

A. No.

Q. That was prior to your purchase of the Kramer patents?

A. That is correct.

Q. Do you know whether at that time they were notifying the trade generally?

A. I have no knowledge whatever as to that.

The Court: Did I understand that for the $17,000 you got something besides the applications for patents, and the patents, some other physical properties?

The Witness: Such things as go with a defunct case, intangible assets, such as engineering drawings, records in the office, a mailing list and such things, but no machinery or plant or equipment.

The Court: No real estate?

The Witness: No, but we did receive some service parts, which formed part of a service stock in a small room.

The Court: But none of the stock?

The Witness: No, not a bit of it.

The Court: That was all sold to somebody else?

The Witness: Yes, sir.

The Court: You got the books and records and patents and good will, or bad will, whatever they had?

The Witness: Yes, sir.

The Court: Did you get the accounts receivable, any of those?

The Witness: No, sirree.

Mr. Frye: It is listed here as the good will, mailing list, names of customers, correspondence, inquiries as to orders, orders on hand. Were there any orders on hand to your recollection?

The Witness: Not one that I saw, and I personally collected what there was to collect in the way of drawings and office records.

Mr. Cooper: When you say "Collected," you mean got together the property you acquired?

The Witness: Yes.

The Court: It seems to be the intangible assets.

Mr. Frye: That is all set up in the paper, your Honor.

Q. When you made these searches that resulted, in the instance of the Wolf patent, for example, that you recommended they be purchased, did you personally ask that search?

A. No, I had that made by assistants in Washington.

Q. Then, within this month, you instituted a re-search, received your authority, and drafted a recommendation, is that what we understand?

A. Yes.

The Court: How many patents was it you had searches made of?

Mr. Frye: 25 patents and 25 applications.

The Court: No, I mean did you have searches made of?

Q. How many did you look up, Mr. Fehr?

A. I don't recall. I remember distinctly about this particular Wolf patent, and there were several others in which I may have made office searches.

Mr. Cooper: That is in your office?

The Witness: That is in my office, or there might have been one or two others involved in the Washington search, but they were so minor in importance, compared with this, that my recollection is not so good on them.

The Court: What is the date of that purchase?

The Witness: January 22, 1922.

Q. In the Kramer instance about how long did you continue in these investigations, if you remember?

A. I don't recall.

Q. Was that done personally or by assistants?

A. I made very few searches personally, generally done by Washington associates.

Q. Are those searches made through the patent only, or through the publications—

A. Well, it depends on the importance of the case, the amount of money involved, and so forth, and in a very important case where it—

Q. We are talking only as limited to the two you have detailed, the Kramer and the Wolf, and I ask you what you did, not what you are accustomed to do.

A. I don't recall about the Kramer patent because when I came here yesterday I did not know I was to testify, and I had not looked up anything for many years.

Q. Your memory does not tell you whether you looked through publications or anything in addition to the patents, is that the way you would like the record to state?

A. Well, I would not want the record to state that I was careless in not looking in all reasonable cases, but I just don't remember.

Q. If you had your Washington associates make a search where would you instruct them to look? or if you did, where did you instruct them to look in connection with the Wolf and Kramer patents?

A. I don't remember that either.

The Court: Have any other suits been brought on any of the patents except this suit?

The Witness: Both these patents are involved in another suit in New York.

The Court: And in the other suits are more than these two patents now here in suit involved?

The Witness: I believe so.

The Court: Some of these others then there that were sued on?

The Witness: I think so.

The Court: Have there been any other suits brought than these two, the one here and that one I speak of?

The Witness: Well, there are really three, there is one in Brooklyn—

The Court: Other than the three then?

The Witness: That is all.

The Court: There have been no suits brought on patents other than these three now pending?

Mr. Cooper: I think that is correct, your Honor. My memory is that in one or more of these suits there are patents that were not involved here at all, but I am only stating—

The Court: But there were some of these patents purchased in this purchase?

Mr. Cooper: Oh, yes, certainly, the Wolf and Kramer were involved in these cases.

(Thereupon an adjournment was taken until Tuesday, March 19, 1929, at 9:30 o'clock A. M.)

This completes the first day's proceedings in full. Additional record of the trial will appear in the next issue.

An Unusual Opportunity for a Woman of Ability

A large manufacturer of electric refrigerators is seeking a woman of ability to head up the activities of demonstrators connected with distributor and dealer organizations and take general charge of research in the field of food preservation by refrigeration. In brief, the job is to determine what should be done and how to do it in a broad program for enlarging the activities of women throughout the sales organization of the company.

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